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The Impact of Perceived Service Quality on Patient Satisfaction and Behavioral Intention: The Case of A Private Dental Hospital in China

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Doctor of Management

Supervisor:
PhD Ana Margarida Passos, Associate Professor
ISCTE University Institute of Lisbon

March, 2022

BUSINESS
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I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: 陈慧玲 Date: 13.10.2021

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Abstract

To explore the impact of perceived service quality on patient satisfaction and behavioral intention in the field of oral health, this research put forth a model of the relationship between perceived service quality, perceived value, patient satisfaction, and their behavioral intentions based on the European Customer Satisfaction Index (ECSI model). The five dimensions of SERVQUAL model are integrated into the three variables, namely enterprise image, medical facilities and medical personnel. Meanwhile, patient participation is introduced as a moderator to explore its moderating effect on perceived value and patient satisfaction. A total of 245 valid questionnaires were collected from patients receiving treatment in the surveyed hospital. Data analysis was carried out using statistical methods including confirmatory factor analysis (CFA), descriptive statistics, Cluster analysis, structural equation modeling (SEM), and three-level regression analysis.

Results show that service personnel of dental institutions have a positive impact on patients' behavioral intention and perceived value, and perceived value positively correlates with patient satisfaction; service facilities also have a positive correlation with patient satisfaction; patient satisfaction positively impacts patients' behavior intention. Moreover, patient satisfaction and perceived value act as mediators when corporate image and service personnel exert influence on patients' behavioral intentions.

Based on above research results, the research proposed improvement solutions to the hospital from the perspective of patient satisfaction and behavior intention, and gave policy suggestions on upgrading the overall service level of the dental care industry in China.

Keywords: Dental health; Perceived service quality; Perceived value; Patient satisfaction; Behavior intention

JEL: I18; M31

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Resumo

Para estudar o impacto da perceção de qualidade de serviço na satisfação do paciente e na intenção comportamental na área da saúde oral, esta investigação explora um modelo da relação entre a perceção da qualidade do serviço, o valor percebido, a satisfação do paciente, e as suas intenções comportamentais baseadas no Índice Europeu de Satisfação do Cliente (modelo ECSI). A investigação integrou cinco dimensões do modelo SERVQUAL e três variáveis relacionadas com a imagem corporativa, facilidade de serviço, e pessoal de serviço em organizações de medicina dentárias. Utilizou-se igualmente a "participação do paciente" como variável moderadora para verificar o efeito moderador da participação do paciente no valor percebido e na satisfação do paciente. A amostra envolveu 245 pacientes de um hospital de medicina dentária que responderam a um questionário. A análise de dados foi realizada utilizando métodos estatísticos tais como a análise fatorial confirmatória (CFA), estatística descritiva, análise de Cluster, equações estruturais (SEM), e análise de regressão a três níveis.

Os resultados revelam que o pessoal de serviço nas instituições dentárias tem um impacto positivo na intenção comportamental e no valor percebido dos pacientes; o valor percebido correlaciona-se positivamente com a satisfação do paciente; as instalações também têm uma correlação positiva com a satisfação do paciente; a satisfação do paciente tem um impacto positivo na intenção comportamental do paciente. Além disso, a satisfação do paciente e o valor percebido atuam como mediadores quando a imagem corporativa e o pessoal de serviços exercem influência sobre as intenções comportamentais dos pacientes.

Com base nos resultados, são propostas ao hospital algumas soluções de melhoria que visam aumentar a satisfação do paciente e da intenção comportamental. São também apresentadas e discutidas algumas sugestões para melhorar o nível global de serviços da indústria de cuidados dentários na China.

Palavras-chave: Saúde oral; Qualidade de serviço percebida; Valor percebido; Satisfação do paciente; Intenção Comportamental

JEL: I18; M31

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摘　要

为了探索口腔医疗领域中患者感知服务质量对其满意度及行为意向的影响，本研究基于欧洲 ECSI 模型提出了感知服务质量、感知价值、患者满意度及患者行为意向间的关系模型。将 SERVQUAL 模型的五个维度融入企业形象、服务设施、服务人员三个变量，并尝试性的添加了“患者参与”调节变量，用以探索患者参与对感知价值和患者满意度作用的调节效应。以中国某口腔医院的诊治患者为研究对象，设计了调查问卷，并开展了问卷调查，获取有效数据 245 份。采用验证性因子分析(CFA)、描述性统计、聚类、结构方程模型(SEM)、bootstrap、三层回归等方法进行了数据分析。

分析结果显示，口腔医疗服务人员会使患者行为意向与感知价值受到正面影响，感知价值对患者满意存在正面影响，口腔医疗服务设施对患者满意存在正面影响，患者满意度使患者行为意向受到正面影响。同时，患者满意度与感知价值在企业形象和服务人员对患者行为意向影响中存在中介作用。

基于以上研究结果，从提升患者满意度进而改善患者行为意向的角度对医院提出了改进方案，并进一步围绕中国新形势下口腔医疗整体服务水平的提升提出了政策建议。

关键词：口腔医疗；感知服务质量；感知价值；满意度；行为意向

JEL：I18；M31

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Acknowledgement

With the completion of my thesis writing, my doctoral study is nearing its end. Looking back to the four years of studying including the thesis writing, I feel it is a very meaningful and unforgettable journey in my life and there are a lot of people whom I would like to thank sincerely and kindly.

My first most profound gratitude is to my mentor, Professor Ana Margarida Passos. Her profound knowledge, rigorous scholarly attitude and tireless in teaching others have benefited me a lot. From the topic selection to the construction of the research framework and to the content design of each chapter, Professor ANA has provided careful guidance with unflagging patience. What most impressed me was that she specially arranged a face to face interview with me after class in Guangzhou. Although it lasted only more than one hour, I surprisingly found that she knew everything about my thesis proposal and gave a deep analysis of the key theoretical models in my research, which has laid solid foundation for my smooth research and thesis writing afterwards. Later, we had a lot of online communications in which I received meticulous guidance and valuable suggestions from Professor Ana thanks to her excellent problems-identifying and solving skills. I am immensely grateful for what she has done for me!

I am also truly grateful for the joint education program jointly run by ISCTE University Institute of Lisbon and Southern Medical University, which gives me an opportunity for further study. I also want to offer my sincere thanks to Professor Virginia, Professor Wang Dong, Mrs. Xv and Ou and all instructors involved in this program. I switched my role from working as a doctor to being engaged in hospital management in recent years, yet deeply feeling handicapped by lack of management knowledge. One year's classroom teachings have enabled me to systematically study public health policies and management theories at home and abroad, which broadened my horizons and let me meet a group of excellent classmates. My study has also brought great inspirations for my future work. The process of thesis writing gives me a chance to reflect on the deficiencies of my current work.

The incredibly busy work and life makes it hard for me to concentrate on my research and thesis writing so that I have had the idea of giving up several times. However, under the warm encouragement and guidance of Mrs. Ou, I finally completed the thesis writing in my spare

time. Her words and deeds have changed my understanding of myself and learning, and urged me to keep the spirit of never giving up in my post in the future.

Finally, I am also grateful to my family. Without your selfless support behind me, I could not have fully thrown myself into the study without distraction. Your strong encouragement and unwavering support are the greatest force of driving me on!

致　谢

提笔致谢时，意味着我在葡萄牙里斯本大学学院与南方医科大学合作举办公共卫生政策与管理博士学位教育项目的学习即将结束。回想学习和写论文的这 4 年，是我人生非常有意义而难忘的一段时光。

首先要向我的导师 Ana Margarida Passos 教授表示由衷的感谢与敬意。她渊博的知识、严谨的治学态度、诲人不倦的精神使我受益匪浅。本文的写作从选题的确定到研究框架的搭建、各章节的设计，Ana 教授都不厌其烦的提供了悉心的指导。我印象深刻那次与教授在广州见面，她在上课之余特意安排与我当面沟通，虽然只有短短 1 个多小时，发现她非常了解我论文开题报告的每一个细节，给我对于关键的理论模型做了深刻的分析，让我论文可以顺利开展。后来又与教授进行多次视频会议，教授总能很敏锐发现我问题，精准地做出修改建议，论文完成之际我心存感激。

我还要感谢葡萄牙里斯本大学学院与南方医科大学在中国合作开展了这个项目，感谢 Virginia 教授、王东教授、欧主任、许主任以及这个项目中所有的老师。我是一名医生，这几年开始从事医院管理工作，缺乏管理知识。一年的授课让我系统地学习了国内外公共卫生的政策和管理理论，开拓视野、认识一群优秀的同学，为今后自己的工作带来很大启发。论文写作过程更是让我有机会深思当前工作中的不足。

由于工作和生活原因，我的论文写作时断时续，也曾几次想放弃。在欧主任的鼓励和指导下，终于利用工作间隙完成了毕业论文的创作。她的言传身教改变了我对自己、对学习的认识，促使我在以后的工作中也保持永不放弃的精神。

最后我要对我的家人说一声“谢谢”，没有你们在背后的无私支持，我不可能毫无牵挂地投入学习，你们的鼓励和支持是我内心最大的动力!

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Chapter 1: Introduction

1.1 Research background and significance

1.1.1 Policy background of China's medical service industry development

China's healthcare reform has been through 37 years since its launch in 1985. The *Report on* Several Policy Issues of Health Reform issued by the State Council pointed out that in order to promote the development of China's healthcare industry (State Council of the PRC, 1985), Chinese government should stream line administration and delegate power to lower level of governments. This report provided a holistic guidance for the progress of the medical reform. Chinese economy was not further developed in the 1980s, thus the policy fully stimulated the vitality of the medical industry. However, due to the shortage of financial and material resources, the supply of basic medical care is very scant especially in underdeveloped rural areas to meet the demands of the policy. Therefore, such problems must be addressed from system reform and policy implementations.

Things have not changed until the 1990s when China issued the Opinions on Deepening Health Reform that led to the market-oriented reform of the healthcare industry (National Health Commission of the People's Republic of China, 1992). Subsequently, a series of innovative medical reforms have been carried out, for example, running small factories and subsidiary businesses in support of healthcare industry, which not only achieved social and economic benefits, but also unleashed immense potential of medical industry across China. However, thereform policies that required further revisement and improvement in the exploratory stage had many grey areas where the health policies were variously interpreted by medical institutions at all levels. Whether the government or the market dominates the reform directly determines how healthcare institutions provide healthcare services.

In the 21st century, the state has gradually carried out the property right reform of the medical industry. The *Guiding Opinions on the Reform of Urban Health System* issued by the State Council encourages the cooperation between various kinds of medical institutions and authorizes the medical institutions to price some services themselves (State Council of the PRC, 2000). There is no denying that these policies have promoted the market-oriented

reform of health institutions, but they also create conditions for some medical institutions to blindly pursue benefits while ignoring the public nature of the healthcare.

In 2005, the *Technical Operation Specifications for Disinfection of Dental Instruments in Medical Institutions* formulated by the Ministry of Health requires that oral health institutions should actively publicize the oral healthcare knowledge and put people's oral health first and include the disinfection of medical devices in the medical quality management and establish a comprehensive disinfection management responsibility system in order to create a good oral medical environment for patients (National Health Commission of the People's Republic of China, 2005). For example, the surveyed hospital is the first to strictly disinfect the dental medical equipment after each treatment in Nanjing.

China's Ministry of Health issued the *National Action Plan for Health Promotion of Hundreds of Millions of Farmers* (2006-2010) in 2006 (National Health Commission of the People's Republic of China, 2006), which clearly pointed out that the health of Chinese farmers should be guaranteed. The action plan also required that efforts should be made to carry out health education across China and raise the awareness of health and self-care among rural residents and students and advocate health behaviors and a healthy way of life.

In March 2009, the CPC Central Committee and the State Council issued the Opinions on Deepening the Reform of the Health System (2009) regarding how to deepen the healthcare system reform (State Council of the PRC, 2009). According to the guiding opinions, efforts should be made to encourage and guide social capital to sponsor healthcare undertakings and form a healthcare system with multiple categories of investors and diversified investment modes and meanwhile ensure the public nature of healthcare after new medical reform.

After that, the Implementation Plan for Deepening Health System Reform During the 12th Five Year Plan Period issued by the State Council proposed to deepen the reform of public hospitals at all levels and promote the further development of non-profit healthcare institutions (State Council of the PRC, 2012). The Plan has become a turning point for the vigorous development of private medical institutions.

Subsequently, China formulated a series of specific policies encouraging social capital to sponsor non-profit healthcare institutions. For example, the State Council issued *Opinions on Promoting the Development of Health Service Industry* in 2013 (State Council of the PRC, 2013). Besides the policies require to make innovations in service mode and give priority to health service institutions sponsored by various non-public sponsors.

The *Outline of the 13th Five Year Plan for National Economic and Social Development of the People's Republic of China* issued by the State Council emphasizes that China should not

only strengthen its construction but also actively guide social capital to participate in the healthcare system and promote its development (State Council of the PRC, 2016b).

A series of reform efforts in China have laid solid foundation for the development of healthcare institutions sponsored by non-public investors, and also created new opportunities for their development.

The introduction of a raft of policies has accelerated the pace of health reform and achieved remarkable results. In particular, the 19th National Congress of the Communist Party of China made new arrangements for the healthcare industry. It is planned to carry out overall design from the top level and advance the development of healthcare industry in a systemic and coordinated way and put people's health and life safety first. China has achieved the first centenary goal in its battle against poverty alleviation in 2020, and 2021 is the first year of the *Outline of the 14th Five Year Plan for National Economic and Social Development of the People's Republic of China*. For the medical service industry with public nature, China will put forward more constructive policies to safeguard people's life safety and health.

China's national system determines that the national policy has a more significant impact on the development of the medical service industry. The policy background has a profound impact on the research contents and results of this research. First, the Chinese government’s policy has a significant impact on the development of the oral healthcare industry.However, it is necessary to clearly define its functions and responsibilities; second, the preferential policies for large public hospitals, sufficient high quality medical resources concentrated in public hospitals, high trust among the public have put private dental health institutions at a disadvantage. Besides, public hospitals have some advanced medical equipment, facilities and treatment methods that are not available in private health institutions, causing private hospitals to lose patients and economic benefits to public hospitals; third, the government's support for private dental health institutions is not enough. Although non-public dental health institutions have given a boost to the oral health services, for a country with vast territory and large population, the demands in many places still cannot be met. The government needs to further provide support for private healthcare institutions. On the other hand, compared with public hospitals, it is difficult for the government to supervise the healthcare institutions sponsored by social capital. Therefore, how to effectively supervise private dental institutions on the basis of protecting people's interests is also a very important topic; fourthly, the government needs to introduce relevant laws to harmonize doctor-patient relationship. With the promotion of healthcare reform, the requirements of relevant policies for doctors have

become clearer and stricter, but there are still no effective measures to constraint the patients' behaviors. In recent years, the incidents of violence against doctors caused by tense doctor-patient relationship are on the increase in China. Therefore, it is necessary to introduce further policies on the basis of relevant research to protect the immediate interests of medical staff and patients. This research is a forward-looking study around the above issues.

1.1.2 Development of oral health and dental industry in China

Because of the influence of national culture and economic conditions, the deeply rooted idea that toothache is not disease has limited the development of the oral health industry in China. Compared with the dental health institutions in western countries, China's dental health industry has been at the low end of industrial chain because of its slow development (Qianzhan.com, 2017). Oral healthcare industry in China started late and is still in its initial stage (Qianzhan.com, 2017).

With the deepening of health reform, a series of factors such as the preferential policies, population bonus, population aging and the transformation of consumption concept of Chinese people have brought new opportunities for the development of the Chinese oral healthcare industry. Because the dental health industry in China is still in its infancy, there is a huge market potential in China (Zhongtou8.cn, 2016). With the strong support of the health policy, oral hospitals have seen fast development in recent years. The number of dentists and clinics has been increasing year by year, and the competition becomes hugely fierce. According to the summary of dental data in 2015, there are 344 oral hospitals in China by 2015, including 157 public oral hospitals and 187 private oral hospitals. Besides, there are 107 oral prevention and control centers (stations), 54 of which are privately owned (China Reports Hall, 2015).

The huge market of oral health industry has attracted the inflow of huge sums of capital to vigorously compete for the market share. Malo Clinic successfully raised 85 million RMB in series B financing in April 2016, with GGV Capital as the lead investor. In April 2017, Lenovo Holdings Co., Ltd. officially announced that it invested 1 billion RMB to Bybo Oral Medical Group that has the largest number of stores in China. Both sides reached strategic cooperation agreement, which is a mark that Lenovo formally entered the medical field. In August 2017, ARRAIL Oral Group, China's reputatious high-end oral chain, officially raised the financing of $90million, which will be used for the construction of new oral health

institutions. By 2025, ARRAIL Oral Group plans to open more than 1000 dental clinics and hospitals nationwide (China Economic Net, 2017).

With large amount of social capital injected into the health industry, the competition in oral health service is becoming increasingly fierce.

According to the statistics from 2014 to 2017, there are more than 15 financing programs whose amount of financing has exceeded10 million RMB in China's oral health industry. The injection of huge sums of capital has offered a very promising future for the oral health industry. With the improvement of living standards and growing awareness of oral healthcare, the market potential of oral healthcare will be further unleashed (Qianzhan.com, 2017). The Chinese oral industry is experiencing a rapid development (Zhongtou8.cn, 2016).

The number of outpatient visits and oral health examinations is increasing, and the oral health level has also been increasingly improved (Qianzhan.com, 2017). The proportion of oral patients to total patients in China has increased year by year, up from 1.69% to 4.25% from 2003 to 2015. In 2015, the number of patients who visited the oral hospitals was about 29 million, and the number of patients for oral examination was 1268 thousand (Qianzhan.com, 2017). After 2012, the growth rate of the number of oral hospitals and hospital visits is faster than that of GDP (Qianzhan.com, 2017). In 2015, there were nearly 65,000 private oral institutions (Qianzhan.com, 2015). In 2016, the market capitalization of the industry was between 70 billion and 100 billion yuan. The growth rate of market scale of second tier cities and first-tier cities is about 14% and 19% respectively (Zhongtou8.cn, 2016).

According to the above estimates, if the annual growth rate of China's health market is 10%, the size of it will reach 20trillion by 2030 and 25 trillion by 2032. Globally, the proportion of oral health industry in the overall market is only 4%. If the proportion of oral health service reaches 4% in Chinese healthcare market by 2032, the market size of oral health will be trillions of RMB (China Economic Net, 2017).

Compared with other developed countries, the number of dentists in China is relatively small. On one hand, the number of dentists per 100 million people is only 100, while the proportion of dentists in the middle-income or developed countries in Europe and America, is 550-1100. The number of dentists per 100 million people in developing countries such as Brazil is 830. However, China is an aging country with the population’s age averaging more than 35 years old, higher than that of India and Brazil (China Reports Hall, 2015). On the other hand, the number of registered dentists in China is relatively small. According to the data released by WFO in 2011, there are about 2000 members of COS (Chinese Society for

Orthodontics), which accounts for 2% of the registered dentists in China. Today, the total number of dentists in China is about 126,000 to 140,000 (China Reports Hall, 2015).

To sum up, China's dental market at current stage has the following characteristics:

1. The overall oral health level has been improved year by year, but the awareness of oral healthcare is still relatively low. In recent years, China's oral industry has formed a relatively complete industrial chain. According to the statistics, the total value of expensive medical equipment (more than 10,000 yuan) in dental hospitals in 2017 was 6.303 billion yuan, up 19.78% from a year earlier; from 2012 to 2017, the average growth rate of the number of dental medical equipment worth 1 million yuan and above was 27.57%, and the average growth rate of dental medical equipment that worths less than 500,000 yuan was 17.27%. According to the China Health Statistical Yearbook 2018 (National Health Commission, 2018), there are about 80,000 private dental institutions in China, covering 40% - 45% of the total oral health service, which is roughly equal to the amount of service provided by the stomatology department of general hospitals. The main factors affecting the scale of the private oral institutions include consumption ability of single treatment, treatment penetration rate, prevalence of oral diseases and population size. According to the data, the above four factors are increasing.

There is still a huge gap between China and the United States in terms of the scale of dental market and consumption level (China Economic Net, 2017). The main reasons are as follows: first, the rate of outpatient visits for oral diseases in China is low; secondly, the level of social medical insurance and health insurance is inadequate, and the level of family financial budget for oral healthcare is low. Compared with critical diseases such as heart disease and cancer, the household expenditure budget of oral healthcare is woefully insufficient; finally, the overall level of per capita disposable income is low, which explains why the expensive high-end oral services in dental hospitals are rarely consumed. Oral disease is frequently occurring and a common disease that affects people’s health. It not only affects oral function, but also causes heart disease, stroke, diabetes and other diseases (D. Z. Fan & Shan, 2019). According to the statistical results, the overall recovery rate of oral diseases in China has increased from 3% to 5% from 2008 to 2017, and the traditional concept of "dental disease is not a disease" is gradually abandoned (China Reports Hall, 2015).

2. The capitalization effects of the oral industry are remarkable. The dental industry is gradually moving towards "high-end of the industrial chain, chain mode and specialized service, and the corporate image of private oral hospitals is gradually improving. Some

previously mentioned typical financing cases in China's oral industry show that the number of oral hospitals with capital injection is increasing year by year, and the capital injections mostly occur in the A round of financing. Meanwhile, the financing scale has been increased with years and the capital investment is mainly used to build chain stores, the application of new materials, and new medical mode such as e-medical service. At the same time, the dental related industries that can reduce the marginal cost such as training and education, data collection platforms, and information management platforms are also developing rapidly. TcMedical (600763), SinoCera Material (300285) went public, which indicates that the oral healthcare market has become a competitive battlefield for capital.

However, the large influx of capital comes with some negative situations in the dental industry, such as insufficient dental talents reserve, low management level, high management cost and long-term losses. Some dental hospitals have become the victims of capital investment, in disregard of the public nature of healthcare institutions.

3. The level of hardware such as medical materials and equipment used in the industry continues to improve, but most of them are imported from foreign countries and therefore the hardware costs remain high. Currently, foreign medical equipment and consumables account for more than half of the Chinese medical appliance market. In 2018, the top ten oral consumables manufacturers are foreign enterprises, including Danaher Dental and Densply Sirona (D. Z. Fan & Shan, 2019).

In recent years, Chinese dental manufacturing enterprises have increased investment in product development, and the number of patents is also increasing year by year. Most dental manufacturing enterprises are located in Zhejiang, Jiangsu, Guangdong and Shandong province (D. Z. Fan & Shan, 2019). The main patent products include dental prosthesis, dental preparations, dental impression materials and dental filling materials. Emerging technologies such as 3D printing technology and relevant products are applied in the dental field. In addition, the application of new high-tech materials in the oral health field also covers the benzoate plasticizer materials, cermet composite materials and polyvinyl chloride resin. The continuous development of these technologies is gradually recapturing the market share of international medical instrument giants, and the market share of foreign medical appliance giants is also decreasing year by year.

Furthermore, the rapid development of digital technology has promoted the digitization process of dental healthcare. The introduction of digital technology and digital treatment schemes has greatly improved the healthcare level and patients’ perceived service quality.

Some Chinese dental hospitals are leading the pack in the world in developing orthodontics and dental implant software.

On January 31, 2019, the National Health Commission of the People's Republic of China issued the *Oral Health Action Plan* (2019-2025) (National Health Commission of the People's Republic of China, 2019), which requires to further promote the upgrading of the oral industry, including oral hardware materials, digital software platform and innovative service mode.

4. Digital technologies such as 3D printing is gradually applied to clinical care, making it possible for patients to require digital and personalized treatment. For example, from computer simulation modeling before operation to accurate 3D printing modeling during operation, then to postoperative data tracking, collection, analysis, and processing, 3D printing technology provides a digital overall solution for dental implant. The application of digital technology has also made it possible for patients to participate in the whole treatment process. Patients can directly acquire treatment information and interact with doctors in real time at the computer terminal and evaluate the rationality and feasibility of the treatment scheme. Meanwhile, patients also want to be involved in the decisions of treatment schemes and learn more about personalized treatment methods and implementation process. With the introduction of diversified and innovative treatment modes, patients will have more perspectives to perceive the service quality. However, digital dental care has put forward higher requirements for digital technology and digital equipment, dental material processing technology, and protection of patients' privacy and intellectual property protection.

5. People's rising awareness of oral healthcare has led to the expansion of the market scale of oral care consumer goods. With the improvement of people's living standards, people have higher requirements for their appearance and healthcare in all aspects. Thanks to product innovation, preferential public policy and commercial promotion, the market scale of oral consumer goods such toothpaste and toothbrush has been expanded and dental care products have become diversified. Many dental patients hope that healthcare institutions can provide follow-up treatment programs, such as how to carry out daily care after surgical treatment and what matters should be paid attention to in order to maintain the treatment effect for a longer time. Dental institutions should pay attention to the rehabilitation of patients after treatment, so that patients can get the medical suggestions even if they have been discharged from hospitals and perceive the service quality anywhere and anytime. On the positive side, the patients' high medical expectations have offered opportunities for hospitals to innovate more methods to meet their expectations.

1.1.3 Medical demands for oral healthcare and main research topics of oral industry

Dental diseases are frequently-occurring and common pertinacious disease affecting people's physical and mental health and quality of life in China. According to the results of the 4th national oral health survey (National Health Commission of the People's Republic of China, 2017). the proportion of people suffering from tooth decay in all age groups in China is very high, but the proportion of patients willing to treat the dental diseases is very low. The prevalence of tooth decay in 5-year-old children reached 71.9%, and the average number of caries was 4.24. 99.5% of 5-year-old children have not been treated, making the tooth decay treatment ratio totaling 4.1%. The proportion of 12-year-old children who have tooth decay reached 38.5%, with an average number of caries hitting 0.86. The treatment ration among 12-year-olds was only 16.5%, which means that 83.5% of tooth caries were untreated. The proportion of dental decay among 55-64-year-old patients was 95.6%, and the average number of caries was 8.69. In this group, the treatment ratio was 16.9%, and 83.1% remained untreated. The proportion of dental decay among people aged between 65 and 74 years old, was as high as 98%, with an average of 13.33 caries. The treatment ration amounted to 12.8%, while 87.2% of cases have not been treated.

According to data released by the WHO, the incidence rate of periodontitis has ranked third, next only to cancer and cardiovascular diseases. According to the results of the 4th national oral health survey in 2017 in China (National Health Commission of the People's Republic of China, 2017), the periodontal health rate of the 35-44 years old group is only 9.1%, that of the 55-64 years old group is 5.0%, and that of the 65-74 years old group is 9.3%. Compared with the results of the 2th national oral health survey in 1995, the caries prevalence rate and average number of decayed teeth of Chinese children have increased, while the periodontal health rate of 35-44 years old and 65-74 years old has decreased significantly, indicating the dental health situation has become more serious. In terms of periodontal disease, the situation in urban areas is better than that in rural areas, the prevalence rate of women is better than that of men, and the situation in eastern areas is better than that of western areas. Whether it is periodontitis or dental caries, there will be tooth loss. According to the survey, each person in the 55-64 years old group lost 5.7 teeth on average, and the number of missing teeth per person in the 64-74 years old group was 9.5. The proportion of people aged 35 to 44 years old with oral mucosal problems is 4195/100,000, and the proportion of people aged 65 to 74 years old suffering from oral mucosal diseases is 6455/100,000. The 2017 national oral

health survey report is the first time in China to obtain data related to oral mucosal diseases in China.

According to the survey results, oral problems are very common among people of all ages in China, but the number of people receiving dental treatment is still small. According to the results of the 4th national oral health survey in China (National Health Commission of the People's Republic of China, 2017), it is found that people have paid increasing attention to oral health, and their behavior, attitude and knowledge about oral health have been greatly improved and changed. For example, 83.9% of people aged 35-44 think that oral health is very important to body health, and 83.1% of them agree that regular oral examination and care is necessary. In terms of the people aged 55-64, 64.5% of them have experience of dental treatment, and 92.2% of them think that dental health plays an important role in daily life. According to the survey of children's parents about their attitude towards dental health, 75.5% of them believe that dental caries are caused by bacterial infection, while 84.3% of them know that eating candy can cause dental caries, and 68.8% will take their children to treat the decayed teeth. According to the fourth national oral health survey (National Health Commission of the People's Republic of China, 2017), the number of remaining teeth in the elderly group increased significantly while the number of edentulous jaws decreased significantly compared with 10 years ago.

With the economic development, people's demand for oral health is increasing. However, the change of diet structure and the increase of sugar intake make oral healthcare more difficult, especially for people in rural areas.

The people's huge demand for oral health in China is both an opportunity and a challenge for dental institutions.

(1) Difficulties in the evaluation of patients' satisfaction and perceived service quality

In order to stand out from the fierce competition, healthcare institutions must solve two problems first: 1) how to adapt to the changes of the market; 2) How to stay ahead of the competing rivals and continue to gain competitive advantage before competition turns white hot (Zhongtou8.cn, 2016). The deepening reform of healthcare system has changed people's concept of medical treatment. With a large number of hospitals to choose from, people tend to choose the hospitals providing best services. Especially in large and medium-sized cities, urban patients have a wider choice because there are large numbers of hospitals to choose from.The number and quality of patients directly determine the prospects of the hospital. In the face of fierce competition, hospitals should adhere to the principle of patient-centered service and pay high attention to the patients' satisfaction. In order to maintain long term

competitive advantages and stay competitive, it is critically important to foster patient's loyalty and increase their willingness to visit the hospital again.

Although patient satisfaction is very important and even critical for the sustainable development of hospitals,influencing factors of patient satisfaction are still unclear because of the differences in patients' expectations, personality, and cognition. Therefore, further studies are needed.

(2) The impact path of perceived service quality on patients' satisfaction and behavioral intention is unknown

As the direct recipients of healthcare services, patients have the biggest say in the service quality (Li, 2016). Perceived services quality is the comparison between the healthcare services that patients expect to receive and the actual treatment received (Y. W. Wu & Yu, 2013). Behavioral intention refers to the extent to which patients show willingness to visit the same hospital again, and praise and recommend the hospital to others (Chen, 2009).

Many researchers have studied the relationship between behavioral intention, patient satisfaction and perceived service quality and the research results show that if perceived service quality is improved, the patient satisfaction and behavioral intention will be improved accordingly, that is, improving perceived service quality is the key to obtaining sustainable competitive advantage and achieving good enterprise performance. Anderson and Sullivan (1993) found that one of the important antecedents affecting satisfaction is perceived quality, which has an impact on the behavior intentions and motivation. Yi (2006) studied the home decoration industry, and pointed out that perceived service quality has a significant positive impact on behavioral intentions and satisfaction. Ji (2012) found that service reliability and perceived quality have a positive impact on satisfaction; behavioral intention is affected by satisfaction. Li (2015) studied the real estate industry and explored the relationship between behavioral intentions and perceived service quality.

Some scholars studied the healthcare industry and examined the relationship between behavioral intention, patient satisfaction and perceived service quality. Zeng et al. (2018) explored the relationship between behavioral intention, patient satisfaction and perceived healthcare service quality in their published article, and found that patient satisfaction has indirect impact on behavioral intention. Wei (2018) studied the oral industry and discussed the relationship between behavioral intention and perceived service quality. The research results show that service quality has no direct impact on behavior intention, but service quality indirectly affects subsequent customer behavior intention through perceived value and satisfaction. In addition, the researcher also studies the impact of different service quality

levels on behavioral intention, satisfaction and perceived value, and the results show that there are great differences.

Although some scholars have studied the relationship between the perceived service quality and satisfaction, behavioral intention from the perspective of patients, with the deepening of medical reform, the relationship between the three research variables will be explored in a deep going way. A careful and extensive literature review shows that there is still little research on the relationship between the perceived service quality and satisfaction, behavioral intention from a medical perspective. The research limitations are as follows: firstly, the dimensions of patients' perceived service quality are variously defined by different scholars. For example, Zeng et al. (2018) divides the perceived service quality into three dimensions: reliability, empathy and responsiveness. Wei (2018) divides the perceived service quality into five dimensions including empathy, responsiveness, tangibility, reliability and assurance. Secondly, how perceived service quality affects the behavioral intention and satisfaction needs to be studied deeply in order to find out the impact path. The scholars are sharply divided on how the perceived service quality impacts the behavior intention. Is it a direct impact or indirect impact? Some researchers think that the perceived service quality has a direct impact on behavior intention while others think that patient satisfaction mediates the relationship between the relationship between perceived service quality and behavior intention.

This research examines the relationship between perceived service quality and satisfaction, behavior intentions and the impact mechanism. Besides, the dimensions of perceived service quality are divided and discussed.

1.1.4 Research problems

Based on the above analysis, we can see that the service products, corporate image, how services are delivered, online and offline service channels and service process of oral healthcare institutions will affect patients' choice of healthcare institutions, and whether these factors are direct or indirect influencing factors is still unknown. According to the researcher's long-term experience and observations in the oral healthcare industry, patients always have lower satisfaction with some influencing factors of service quality they think very important. In addition, exploring the impact of the perceived service quality on patient satisfaction and behavior intention can figure out what the patients care about most and based on which

hospitals can adjust their business strategies and further provide some opinions and suggestions for the oral health policy.

Therefore, this research will focus on the following questions:

(1) Since the number of dentists per one million people in China is very small, and there is a strong demand for dental care, then why are some private dental institutions still suffering long-term loss?

The patients visit dental hospitals and even are willing to enjoy services at a high price because they do it out of actual needs and can afford it. But what motivates them to choose the same hospital or consume pricey services again is the patients' perceived service quality. Different dental institutions should provide different services with different prices for different groups of patients according to their actual conditions and needs. But many dental hospitals blindly purchase expensive high-end medical equipment and materials and impose "one size for all" expensive medical services on patients in order to transfer the costs to consumers, which causes the loss of patients and business losses for years.

(2) Why are some hospitals often visited by patients although these hospitals are located in poor locations with outdated medical equipment?

There are many factors influencing patients' choice of medical institutions, including perceived service quality, convenience and patient's personality, among which perceived service quality determines whether the patients choose the same hospital again. Although some hospitals are poorly equipped, their service quality is high. For example, the Capital Institute of Pediatrics in Beijing is a hospital with a history of more than 60 years. Despite its outdated medical equipment, it is still the most popular hospital for patients with pediatric diseases. The secret lies in the patients' high trust in their medical level.

(3) What factors lead to differences in patients' perceived service quality, and what is the relationship between these factors?

There may be the following dimensions: the expectation of patients, the enterprise image of medical institutions, the impression of patients on the hardware of medical institutions, and the impression of patients on the service of medical institutions. Three of them come from patients, so it is necessary to classify the patients. The expectation of patients is affected by the degree of patients' participation, and vice versa. Dental diagnosis and treatment is not a one-sided medical service, it needs active cooperation and moderate patient participation.

(4) What are the influencing factors of perceived service quality on satisfaction and behavioral intention?

There are two influencing factors of patients' satisfaction, that is, patients' expectations of service quality and the perceived service quality. The degree of fit between the two will affect their final satisfaction. Generally, perceived service quality is positively correlated with satisfaction, and satisfaction is positively correlated with patients' behavioral intention (willing to revisit the medical institution again). Some researchers believe that perceived service quality positively relates to perceived value, and perceived value is positively correlated with patient satisfaction (Woodruff, 1997; Zeithaml, 1988). Perceived service quality affects patient behavior intentions through perceived value and patient satisfaction.

(5) From the perspective of perceived service quality, what should medical institutions do to make patients choose to visit again?

The hospitals should maintain a good image and provide medical services that meet or even exceed the expectations of patients (after-sales). By improving the hospital image, medical hardware and software level and the convenience of patients to participate in the treatment process, hospitals can improved the perceived service quality, perceived value, patient satisfaction, and ultimately affect their behavior intentions.

1.2 Research framework

This research analyzes the relationship between patient satisfaction, behavioral intention and perceived service quality. Firstly, theoretical analysis is conducted and then the research hypotheses are put forward and tested. Then the empirical analysis is made to verify the hypotheses.

Patients with positive behavioral intention would visit the hospital again when they need medical treatment, and would also recommend the hospital when their relatives and friends are ill. When the hospital changes its location or set up a branch, they would still choose or recommend the hospital, so they are highly loyal to the hospital. It can be seen that the positive behavioral intention of patients brings not only great economic profits but also good social benefits to the hospital. The recommendation of the hospital's medical services to others by loyal patients helps to attract new consumers, establish a good reputation for the hospital, build harmonious doctor-patient relationship, and contribute to the healthy and sustainable development of the hospital.

With the patients in a private dental hospital in Nanjing as the research objects, and based on the impact mechanism of patients' perceived service quality on satisfaction and loyalty, the research attempts to provide useful suggestions for managers of private dental hospitals to

improve patient satisfaction and behavioral intention, thus in an ultimate bid to improve the hospital's medical service quality and competitiveness.

This thesis consists of six parts, and the research is shown in Figure 1.1.

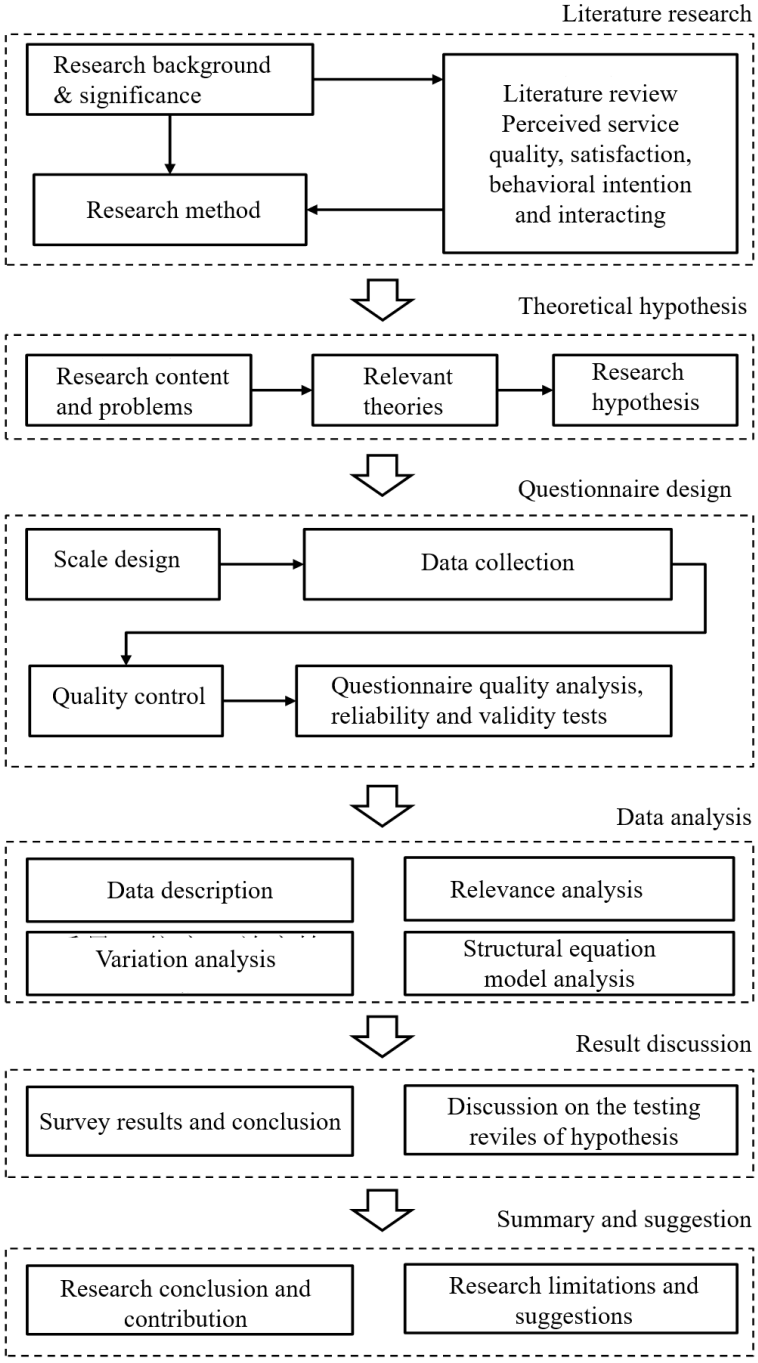

Figure 1.1 Framework of research

In the first chapter, the research background and research methods are presented, and the current research results regarding the relationship between behavioral intention, patient satisfaction and perceived service quality are carefully reviewed and summarized, and the relevant theories are selected.

In part two, based on the literature review, the research subject is taken into account to determine the specific research content and questions, relevant theories about research questions are elaborated, and finally put forward feasible theories and method suitable for this research.

In part three, a research model is designed and research hypothesis that guides the questionnaire design is put forward. Meanwhile, this research investigates and analyzes the current situation of hospitals, aiming to make the questionnaire more pertinent and providing a basis for suggestions on hospital reform and relevant policies of dental healthcare.

In part four, a scale is deigned based on the SERVQUAL scale and specific survey content. The fourth part also clarifies sample size, sample collection method, and data collection process, and describes the quality control methods.

In the fifth part, data visualization on collected questionnaires is conducted. Empirical research analyses including descriptive statistical analysis, quality, reliability and validity analysis of the questionnaire are carried out. Meanwhile, Structural Equation Model is adopted to conduct systematic quantitative analysis on collected data.

The sixth part discusses research conclusions and results of the hypotheses put forward in the second part. Based on research conclusions, a targeted hospital reform plan is put forth. The research summary and suggestions on further research are listed in this part as well.

1.3 Innovations

The purpose of this research is to explore the relationship between patients' perceived service quality, perceived value, satisfaction and behavior intention, and attempt to innovations from the aspects of research object, research method and result analysis.

(1) The innovation of research objects. With a private dental hospital as the research object, the research contents and purpose will be more targeted and the research results will be more meaningful.

(2) The innovation of research methods. Based on the different satisfaction models and the research findings of other scholars, this research designs an improved satisfaction questionnaire scale; meanwhile, based on the European ECSI model, the research proposes a research model based on patient’s perceived service quality, patient participation and corporate image. Based on FOCUS-PDCA method, a long-term impact mechanism to improve patient satisfaction is established.

(3) The innovation of enterprise business strategies. The research put forward a series of measures to improve patients' perceived service quality and perceived value, and explore the best service mode that can meet the expectations of patients by studying the impact of patients' participation in the treatment process on patients' perceived value. The improvement measures include enhancing and maintaining the corporate image, improving the level of medical technology and the quality of treatment, improving the service process, formulating rules and regulations, improving the service environment and service attitude.

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Chapter 2: Literature Review and Theoretical Framework

2.1 Perceived medical service quality

2.1.1 Concept of perceived medical service quality

Prof. Grönroos from Sweden put forward the concept of perceived service quality in 1982, believing that the service quality is a comparison between customers' expectations and the actual perception of the services when they purchase services (Grönroos, 1993). Patients would provide good assessment, if the actual services they receive are beyond their expectations, while they would give poor assessment if the actual services are below expectations.

Medical treatment falls into a category of service to which the concept of perceived service quality applies. Some scholars have combined the research results of perceived service quality with the characteristics of the medical service sector to conduct research on the diagnosis process, treatment effects, hard power of the medical institutions, staff's attitude, and other factors, based on the features of medical services. The research was about a comparison between the medical services patients actually received and their expectations (J. C. Wei & Shen, 2007; J. C. Wei et al., 2007; J. Yang et al., 2006; Y. W. Wu & Yu, 2013). With the deepening of the research in this feild, some scholars defined medical service quality from the perspective of medical institutions as the degree to which medical institutions can meet the patients' demand (Li, 2013). Therefore, the major difference between perceived medical service quality and medical service quality lies in their different subjects.

Most researchers define the quality of medical service from two perspectives: the service receiver and the service provider. From the perspective of medical service providers, the medical service quality refers to the ability of service providers to meet the medical needs of patients through existing medical resources. Generally, it can be measured by objective indicators such as preliminary diagnosis, coincidence rate of diagnosis, recovery rate and misdiagnosis rate (Roemer & Montoya, 1988).

From the perspective of the service receiver, the quality of medical service has a broad definition, which not only refers to the treatment effect, but also the gap between the actual medical service received by patients and the expectations of patients (Abby et al., 1984). With

the customer-centered concept highly advocated, most scholars tend to study medical service quality from the demand side. Therefore, this research defines medical service quality as the difference between patients' expectations of service quality and the actual perceived service performance. Therefore, the research measures the medical quality from two aspects: one is the subjective quality, including whether the medical environment is comfortable, whether the service is timely, whether the waiting time is long; the other is the treatment outcome, including whether the treatment is effective and whether the treatment process is safe.

The tool for the research on perceived medical service quality is mainly SERVQUAL Measurement Scale. The research aims to explore the patients' expectations and actual feelings of the medical service quality and draw conclusions through comparison. The difficulty lies in the accurate grasp of the patients' expectations before they get access to medical services, even a grip on the patients' real-time expectations when they are given diagnosis and treatment. It is difficult to practically grasp the patients' expectations due to the unpredictable time for the onset of illness and the real-time changes in patients' expectations. The investigation into patients' expectations will be less operable after they are in hospital. Many patients do not decide the departments in which they receive the diagnosis and only have a rough idea of their illness until they get help at the triage counters in the hospital. Patients' expectations vary according to different diseases. With the advancement in treatment, many patients will raise their expectations. On the other hand, patients' expectations can be affected by their perceptions. For instance, if they are not satisfied with the services, they may exaggerate their comments. Therefore, it is debatable whether it is necessary to confirm patients' expectations through research. If the research involves too many details, changes in patients' expectations will lead to unreliable results. If the investigation focuses on the overall situations, like the patients' overall expectations, it will be of little practical significance for the research results, as patients often find it hard to describe their expectations in detail. They generally expect a complete cure for the diseases and the elimination of symptoms. Based on the above analysis, this research regards patients' overall feedback on the medical service quality as the result of the comparison of actual service they received with their expectations. When filling in the questionnaire about the perceived quality, patients have taken their expectations into account. Thus, it is not necessary to particularly set the expectations as variables for evaluation. The perceived medical service quality in this research refers to the overall assessment of the medical institutions where patients are provided with medical services, with patients' expectations covered.

2.1.2 Medical service quality model

An extensive review of literature on medical service quality, it is found that there are many kinds of models to evaluate the medical service quality. In this part, three theoretical models used in this research are introduced, including SERVPERF model, SERVQUAL model and service quality gap model. In this research, SERVQUAL model is used to evaluate the oral medical service quality.

(1) Service quality gap model

Parasuraman, among others, established a service quality gap model, also known as PZB model, in 1985. This model is used to measure the gap between patients' expectations of service quality and the actual perceived service performance. There are five kinds of gaps as follows (Parasuraman et al., 1985).

Gap 1: the gap occurs when the managers' perceptions of patients' expectations and the expected service quality of patients are inconsistent. The patients' expectations are influenced by the reputation of medical institutions and personal experience-based judgment. The managers' perceptions of patients' expectations are affected by whether hospitals have established a close relationship with patients and whether they can provide medical services based on market demand.

Gap 2: The actual services do not meet the service quality standards possibly because of insufficient resources.

Gap 3: The conflicting service standards make it difficult for service provides to comply with or they fail to obey the service quality standards.

Gap 4: Because of lack of understanding the average service quality in the medical market, the hospitals over commit their service quality or fail to deliver the service quality as promised.

Gap 5: There is a gap between patients' expectations of service quality and the actual perceived service performance. The expected service of patients is directly or indirectly influenced by reputation of hospitals and personal previous experience.

Gap 5 is the patient's actual feelings about the services received based on the cumulative effect of all gaps mentioned above. If the services have met or exceeded customers' expectations, the customers will be satisfied; otherwise, the customers feel dissatisfied.

(2) SERVQUAL measurement model

Based on the service quality gap model, Scholars Parasuraman et al. (1988) found 10 influencing factors of service quality, and then further divided them into five dimensions,

namely tangibility, reliability, assurance, responsiveness and empathy in 1988. They developed SERVQUAL service quality measurement scale consisting of 22 indicators.

Tangibility refers to visible things that can be directly felt and sensed by patients, including medical staff, medical facilities and other instruments used in the service process. Reliability refers to the ability of medical providers to provide their promised services reliably and accurately. They should fulfill their promises timely and strictly ask for the agreed prices. Responsiveness means the medical staff can give immediate response to the patients' requests and satisfy their service demands. Assurance refers to the knowledge and politeness medical staff exhibits when delivering services, including respect for patients, honesty, proficiency and attentiveness. Empathy refers to the ability to provide customers with the services they need and show care for them, for example, providing convenient services and meeting customers' other service needs (Wei, 2018).

The SERVQUAL scale has been widely used in various service industries, including the medical industry. However, some researchers point out the defects of the scale: ① The questionnaire measures the customer's perceived service quality and expectation at the same time with redundant questions. The question items regarding customer's expectations cannot get a clear response from respondents; and the respondents' responses to questions regarding service quality are strongly objective and psychological. Therefore, the measurement results are not accurate enough. ② The operability of the measurement method is in doubt. Gilmore and Carson (1992) questioned whether the negative questions regarding responsiveness and empathy in the questionnaire are highly reliable and valid. In response, PZB changed the negative questions into positive questions in 1990. ③ Due to the differences in industries and application scope, the vagueness of questions tend to mislead respondents from different industries to misinterpret the original meaning of the question items, thus throwing doubt on the measurement results.

(3) SERVPERF (Service Performance) measurement model

Because researchers are skeptical about SERVQUAL scale, Cronin and Taylor (1992) found in their research that the service quality can be fully measured by comparing customers' expectations of service quality and the actual perceived performance. Based on this idea, they developed SERVPERF scale based on SERVQUAL scale (Cronin & Taylor, 1992). The SERVPERF scale only reserved the questions regarding the customers' perceived service quality, which is more applicable and practical.

Many foreign researchers have also confirmed the practicability of SERVPERF scale in the medical industry, such as Lam (1997), Paul III (2003), Jain and Gupta (2004). With the patients in two hospitals in Macao as research objects, Tang (2003) conducted an in-depth research on service satisfaction and found the SERVPERF scale is applicable. Zhao et al. (2009) studied the Chinese nursing service and confirmed the high applicability of SERVPERF scale after SERVQUAL-based modification. Therefore, many Chinese researchers have built service quality system index that suit Chinese conditions based on SERVPERF model such as Li (2007), Pan (2009), Shen (2005), and Zhao et al. (2009).

To sum up, SERVPERF is a simplified version of SERVQUAL. In order to make the research data more reliable and convincing, this research uses the five-dimension model of SERVQUAL scale to analyze patients' perceived service quality in the dental industry.

2.1.3 Measurement index of medical service quality

Many researchers in the medical service field have established measurement models suitable for the regional conditions based on the five-dimension SERVQUAL scale or SERVPERF scale, as shown in Table 2.1. Despite an over ten-year history of research on perceived medical service quality in China, there is still a wide gap between the relevant research at home and abroad. Xin et al. (2010) undertook research on the evaluation of the medical service quality at the grassroots level in rural areas. In developing countries, the medical service quality at the grassroots level in rural areas, as a basic guarantee for the people, is of vital strategic significance for the country. By 2021, the 100th anniversary of the founding of the Communist Party of China (CPC), China has scored a complete victory in its fight against poverty. Medical insurance coverage and people’s satisfaction with medical services serve as an important part of the definition of poverty alleviation. In this regard, Chen et al. (2009), as well as Gao et al. (2010), delved into the reasons for the gap in health service quality between different communities in the same regions and between similar communities in different regions. All the aforesaid research was conducted from the perspective of patients, Li et al. (2014) and Li and Lu (2014), and Li et al. (2014) taking staff in medical institutions as the objects of study, evaluated the staff’s perceptions of service quality to improve the medical institutions’ services and decision making. Some scholars theoretically explored the possible dimensions and measurement methods of perceived medical service quality based on the characteristics of medical and nursing services (X. Wu et al., 2013; Yu et al., 2014). Y. W. Wu and Yu (2013) made a comparison between the perceptions of medical staff and patients,

confirming the differences in the way medical staff and patients understood and described perceived service quality. Chou et al. (2005) conducted research on the logical relations among variables such as surgical inpatients' perceived medical service quality, satisfaction, and perceived value on the basis of the revised measurement scale. Some scholars found it more helpful to meet the patients' mental needs than to satisfy their physical needs in improving patients' perceived medical service quality and satisfaction. The conclusion was based on the systematic analysis of the relationship between the descriptive characteristics, environment, and service atmosphere of the samples and the perceived medical service quality and satisfaction (Ling et al., 2007; Xiong & Peng, 2009).

Table 2.1 Measuring dimensions of medical service quality based on the five-dimensional model

Author	Research objects	Measuring Dimensions
Lim and Tang (2000)	Hospitals in Singapore	Tangibles, reliability, responsiveness, assurance, empathy, and accessibility
Cho et al. (2004)	Emergency Room	Convenience, concern of doctors on patients, concern of other personnel on patients, and tangibles (four dimensions with 13 items)
Wisniewski and Wisniewski (2005)	Colposcopy Clinic in the Hospital	Tangibles, reliability, responsiveness, assurance, empathy
Rohini and Mahadevappa (2006)	Hospitals in Bangalore	Tangibles, reliability, responsiveness, assurance, empathy
Shen (2005)	Secondary Hospitals	Tangibles, reliability, responsiveness, empathy (five dimensions with 22 items)
Niu (2006)	Inpatients	Tangibles, reliability, sense of trust, responsiveness, human-oriented services, effectiveness, and affordability (seven dimensions with 28 items)
Li (2007)	Class A grade 3 hospitals	Communication efficiency, reliability, special services, and facilities (four dimensions with 22 items)
Zhao et al. (2009)	Inpatients	Assurance, reliability, responsiveness, and empathy (four dimensions with 29 items)
Tian and Zhang (2013)	Inpatients	Tangibles, reliability, responsiveness, and empathy
Guo (2016)	Class A grade 3 hospitals in Qiqihaer	Reliability, tangibles, responsiveness, assurance, empathy, affordability (six dimensions with 25 items)
Li (2016)	Inpatients	Reliability, tangibles, empathy, affordability (four dimensions with 15 items)

It can be found from Table 2.1 that when establishing the medical service quality model based on SERVQUAL scale or SERVPERF scale, researchers use different dimensions and question items according to research purpose and research objects in different contexts.

Therefore, this research also revises the SERVQUAL scale in order that the modified scale is suitable to measure the oral service quality.

2.2 Perceived value

2.2.1 Concept of perceived value

Drucker proposed in 1954 that the purpose of consumers' acceptance or purchase of services or products is to obtain value, and the enterprise's performance is affected by the perceived value (Drucker, 1954). Miles argued that value refers to something useful that is obtained by the consumers through purchase of goods or services (Miles, 1972). The two researchers first introduced the concept of value and developed the theory of perceived value. Afterwards, other researchers define the perceived value from different perspectives, as shown in Table 2.2.

Table 2.2 Definitions of perceived value

Scholars	Definitions of perceived value
Zeithaml (1988)	The overall effectiveness evaluation after the comparison between the perceived benefits and the perceived loss of the customers
Monroe (1991)	Can be measured with the ratio between perceived benefits and perceived sacrifices
Woodruff and Gardial (1996)	The balance between expected benefits and expected loss
Ulaga and Chacour (2001)	The process of comparison, balance, and the choice of the best of the customers in multiple benefits and loss between the suppliers and referenced suppliers
Sheth et al. (1991)	Not only include the use value of the product, but also include the social, emotional, cognitive, and scenario values
Anderson et al. (2000)	Results of the customers' comparison of the value between the product and other products. The higher the perceived value is, the more satisfied the patient is.
Chen and Dubinsky (2003)	The net benefit of expected benefits of consumers deducting the expenditure cost
Woodruff (1997)	The value of customers consists of product attributes, effectiveness of attributes, and intended usage. The value perceived by customers at different levels is formed by the gap between the expected product value of the customers and the perceived value of actual products.
Dong et al. (1999)	The balance between the payment and the received benefits of customers after they purchase a certain kind of product or receive some services
Chen (2003)	A subjective balance of customers on advantages and disadvantages of the products and the services

According to scholars' definitions of perceived value, perceived value is variously defined based on comprehensive evaluation theory, multi factor theory and trade-off theory. The

trade-off theory holds that people's perceived value is a comprehensive comparison between the perceived gains and perceived loss. The multi factor theory extends the connotations of the perceived value and integrates emotional value and use value into perceived value (Sheth et al., 1991). The comprehensive evaluation theory is the combination of the above two theories, which considers perceived value as the cost-benefit analysis at different levels (Woodruff, 1997). The research findings of Zeithaml (1988) are widely accepted by other scholars. Based on this, this research defines the perceived value of patients in the oral healthcare context as the overall evaluation of the perceived benefits after receiving oral care services and the paid cost for the services.

2.2.2 Dimensions of perceived value

Sheth et al. (1991) established a five dimension model of perceived value in 1991, which provides basis for researchers to divide the dimensions of perceived value, as shown in Table 2.3.

Table 2.3 Definition of five-dimensional model of perceived value

Dimension	Definition
Functional value	The functions of products or services to satisfy people’s demands
Social value	Purchasing this product or service would closely relate people to other communities in the society, which will satisfy people’s demands as a part of the society
Emotional value	The products or services satisfy people’s emotional demands
Curiosity value	The products or services satisfy people’s curiosity or help people to acquire knowledge
Situational value	In some situations, the products or services can temporarily satisfy people’s demands or realize their value in the society

Based on Sheth's research results, scholars at home and abroad have put forward their own dimension division of perceived value as shown in Table 2.4.

Table 2.4 Divisions of dimensions in perceived value

Author	Research object	Divisions of dimensions
Parasuraman (1997)	Field of product circulation	Obtained value, use value, disposal value, and redemption value
Sweeney and Soutar (2001)	Durable consumer goods	Emotional value, social value, quality value, and price value
Kantamneni and Coulson (1996)	Product vision	Functional value, market value, social value, and experience value
X. C. Fan and Luo (2003)	Traditional enterprise strategies	Functional value, emotional value, and social value
Feng and Duan (2008)	Medical industry	Functional value, emotional value, and social value
B. Wang and Duan (2014)	Community-based medical institutions	Functional value, emotional value, image value, special value, time

		cost, and money cost
T. T. Guo et al. (2015)	LBS advertisement	Perceived cost, situational value, safety value, social value, and cognitive value
Hu et al. (2017)	Mobile medical environment	Functional value, emotional value, efficiency value, and social value

From the summary above, we can see that for different services and products in different situations, the measurement dimensions of perceived value are also different. However, on the whole, they all cover the functions that can meet people's use needs, emotional needs, service efficiency needs and other needs. Efficiency value is defined as the comparison between the time and cost spent and perceived benefits gained.

The research argues that the main function of dental medical institutions is to provide more convenient and professional medical services for people and ease the pressure of large general hospitals on services. Therefore, this research uses the dimensions of perceived value developed by scholars Wang and Hu to measure the perceived value from functional value, emotional value, time cost, money cost and social value.

2.2.3 Research directions of medical perceived service quality

The previous research on medical service quality is mostly conducted from the perspective of medical providers. With the medical staff, medical departments as research objects, the treatment process and treatment outcome are evaluated. S. G. Li et al. (2004) evaluated the quality of medical service through the medical quality evaluation standard.

With the improvement of living standards, people’s needs also change. When their basic needs are met, they move on to a higher level of needs. In the past, people only cared about the treatment outcomes regardless of the medical service quality, but now people have higher requirements for medical quality. Therefore, patient satisfaction needs to be evaluated from many aspects. In view of this, it is necessary to measure the medical services from the patient’s perceived service quality. Xin et al. (2010) found that the low medical level, poor equipment yet high fees in basic level medical centers in rural areas lead to the low perceived service quality. After comparing and analyzing the characteristics of medical services at home and abroad, Ou (2011) established a patient satisfaction model with dimensions of patients’ expectations, environment quality and perceived service quality. Piper et al. measured the quality of medical service according to the actual experience and feelings of patients in the process of treatment (Piper & Lamb, 2014). Murawska (2013) evaluated and analyzed the management information of medical service quality from the perspective of patients, and

pointed out that for patients, the waiting time is an important factor influencing their satisfaction. Other influencing factors include whether the receptionist is polite and whether the nurses are kind to them.

2.3 Patient satisfaction

2.3.1 Concept of patient satisfaction

With the new public management theory that has been attracting increasing attention, the public service institutions began to introduce the market-oriented mechanism into the medical field, so as to improve the patient satisfaction. The patient satisfaction is variously defined by different researchers, as shown in Table 2.5.

Table 2.5 Definitions of patient satisfaction

Scholars	Definitions of patient satisfaction
Risser (1975)	Degree of coherence between patient expectations about ideal nursing care and their opinions about the nursing care actually provided
Pascoe (1983)	Patients' evaluation of whether the healthcare that they receive meets their own needs.
Woodside et al. (1989)	An attitude of patients towards how much they like or dislike the medical service after treatment
Singh (1990)	Patients' multifaceted evaluation of all aspects of medical services received in a specific situation
Dozier et al. (2001)	A comparative judgment of the perceived medical services of patients and their expectations about medical services
Rundle et al. (2003)	Patients' comprehensive attitudes towards the perceived medical services, including cognition and emotion
Feng (1996)	Patients' experience and subjective feeling of the medical services received
M. Y. Wang and Huang (2004)	Patients' expectations about medical services for meeting their health demands and improving their life quality and their comprehensive evaluation of the perceived services
Qian et al. (2015)	Under the relatively rational cognitive level and environment, people's expectations about medical services for meeting their demands in diseases treatment and prevention and their rational evaluation of the perceived services

Although the definitions of patient satisfaction by different scholars are slightly different, they essentially refer to the comparison between patients' expectations of service quality and the actual perceived service performance. Patient satisfaction has three characteristics. Firstly, patient satisfaction is people's subjective evaluation of the medical services they received, which is affected by their life experience and income level. Secondly, according to Maslow's

hierarchy of needs, when receiving medical services, patients with different levels of needs have different subjective evaluation standards. Even for the same services, they will give different evaluations. Thirdly, with no objective evaluation standards on hands, patients can only compare the services they receive with other similar services or previous experience they had, and then give their satisfaction evaluation (Wei, 2018).

Because the oral health service is still in its infancy, people still do not know much about it. After receiving the oral service, patients tend to compare it with the previous medical services, and then give their satisfaction evaluation. In this research, the patient satisfaction is defined as the actual feeling of patients about the treatment process, which is a subjective comparison between expectations of service quality and perceived service quality.

2.3.2 Influencing factors of patient satisfaction

Exploring and identifying main influencing factors of patient satisfaction not only provides the basis for hospitals to reflect and improve their service quality but also offers satisfaction evaluation standards for patients. Researchers around the world have conducted a lot of research on factors affecting satisfaction.

Pink et al. concluded that the ability of doctors and medical expenses will affect patient satisfaction (Yu & Li, 2013). Draper found that the waiting time, the accuracy of disease diagnosis and the time spent in receiving medical services affect patient satisfaction (Draper & Hill, 1996). Tucker believes that medical experience, health level, nationality factor affect patient satisfaction (Tucker III & Kelley, 2000). In 1993, Hall and Milbum found that there is a negative correlation between patients' satisfaction and psychological pressure (Hall et al., 1993). Besides, Hasin et al. (2001) found that hospital catering services, traffic convenience, departments, service attitude and medical environment affect patient satisfaction.

Chinese researchers also explored the factors that affect patient satisfaction from different perspectives. After in-depth research, Dou (2009) pointed out that the situation of patients and medical institutions, patients' demographic factors and research and analysis methods have an important influence on patients' satisfaction. L. J. Liu and Guo (2004) found that patient satisfaction is affected by demographic factors, nurse-patient relationship, doctor and patient relationship, waiting time, doctor's ability, medical expenses, medical environment, treatment outcomes, medical equipment, living facilities and health education. Zhan and Wei (2000) conducted the stepwise regression analysis based on single factor and multiple factors methods and found that age, education level, medical departments and patients’ occupation

have varying degree of impact on patient satisfaction. After survey and statistical analysis, N. Zhang et al. (2011) found that the medical environment and the response of medical staff to patients' query can affect the overall satisfaction. W. L. Liu et al. (2014) established a patient satisfaction model to explore the relationship between satisfaction and medical environment, medical ethics. S. T. Hou and Zhang (2013) studied the inpatients in a hospital in Beijing, and found that patient satisfaction is affected by the length of waiting time and whether the medical equipment is advanced.

Z. M. Li and Liu (2008) found that patient satisfaction is affected by treatment outcomes but not affected by medical expenses. Lan et al. (2014) found that medical staff's service attitude has the greatest impact on patient satisfaction, followed by the ability of medical staff, treatment results, doctor-patient communication and medical expenses. P. Zhou et al. (2013) studied the influencing factors of patient satisfaction from the perspective of hospital culture, including the patient-oriented concept, competitive spirit, capability development, team orientation, organizational coordination and social responsibility.

A summary of previous research shows that patient satisfaction is affected by a lot of factors including medical technology, traffic convenience, medical environment, medical costs, doctor-patient communication, and patients' individual factors.

2.3.3 Measurement of patient satisfaction

The concept of patient satisfaction is derived from customer satisfaction. Although research subjects are different, the two concepts both reflect the gap between people's expectations and actual service experience. Therefore, all evaluation methods of customer satisfaction can be used for patient satisfaction evaluation. Customer satisfaction is divided into overall satisfaction and service process satisfaction. The service process satisfaction measures the customers' psychological and emotional responses in the process of receiving services. The overall satisfaction measures the overall emotional response of customers after receiving all products and services provided by service providers (Z. L. Yang et al., 2004).

This purpose of this research is to measure the overall feelings of patients about the oral health service received. Scholars generally use multi-item scales such as expectation discrepancy scale, satisfaction scale and performance scale to measure overall satisfaction, performance outcomes, and the gap between expectations and actual experience. On this basis, this research constructs a standard measurement system of patient satisfaction.

2.3.4 Current situation of research on patient satisfaction in oral health field

Oral healthcare is an important branch of the medical industry. With the development of social economy and the rising of people's health awareness and living standards as well as the aging of population, people are paying more attention to oral health and therefore the medical demands for oral healthcare have sharply increased. However, the satisfaction of oral patients is still be least researched, which will be discussed below.

At present, the research of satisfaction of oral patients is mainly conducted through the questionnaire survey. The questionnaire is generally designed based on relevant mature scales without assigning weights to measurement indicators. The data analysis method is only limited to descriptive statistical analysis. Ye and Lin (2006) designed the satisfaction survey questionnaire to explore the influencing factors of satisfaction of outpatients in Guangdong oral hospitals. Gong et al. (2015) studied the patients in an oral hospital in Hangzhou and found that patient satisfaction is mainly influenced by medical environment and medical expenses. Meanwhile, they categorized the patients into four age groups and conducted a comparative study. A. L. Zhou et al. (2013) conducted a questionnaire survey on patient satisfaction among the oral health institutions in Gansu, Lanzhou and put forward the measures to improve the deficiencies of oral services and patient satisfaction.

Some researchers have conducted special research on the satisfaction of oral outpatients, which has provided the basis for later research. Chen et al. (2015) divided oral outpatients into control group and experimental group for satisfaction research. After providing personalized nursing, they found that personalized nursing can significantly improve patient satisfaction and nursing efficiency. Wang (2013) found that the oral service quality can be improved through improving service consciousness, changing working methods, improving nursing process, promoting incentive system, perfecting nursing quality management and conducting comprehensive quality evaluation. Lin and Li (2013) conducted a satisfaction questionnaire survey and found that patient satisfaction is affected by medical service ability, medical expense and medical environment.

On the whole, the research on oral patients' satisfaction is still insufficient and existing research is focusing largely on satisfaction surveies based on self-made scales and questionnaires. There are still no widely accepted scales and questionnaires.

2.4 Customer behavior intentions

2.4.1 Concept of customer behavior intentions

There are extensive studies on behavioral intentions by scholars around the world and people hold identical views about behavioral intention. The behavioral intention refers to the intention or possibility of what people are going to do next. Behavioral intention stemmed from the concept-behavior theory, which holds that the behaviors of customers are influenced by behavioral intentions determined by people's attitude. In 1975, Fishbein and Ajzen (1977) established the theory of planned behavior, which was widely accepted by most scholars. This theory analyzes the psychological state of people before they engage in specific behaviors and points out that people develop the intention to perform a certain behavior under the influence of a series of internal and external factors, and the intention directly affects the actual behaviors of customers.

Fornell et al. (1996), based on the relevant models in the United States, found that the customer satisfaction with service received will influence the individual's subsequent behaviors and the behavioral intention is the likelihood of an individual engaging in actual behaviors. Based on this view, Kotler (2004) defines behavior intention as the customer's idea or plan of performing a behavior based on the satisfaction or dissatisfaction with the product(s) he or she purchased.

Therefore, it can be seen that scholars are basically consistent with their views on behavioral intention. Therefore, this research defines the behavior intention in the oral medical service context as the possibility of patients to perform particular behaviors according to their satisfaction after receiving oral medical service.

2.4.2 Measurement of customer behavior intention

In general, customers' behavior intention is rooted in their loyalty (Chen, 2009). Researchers expect the customer behavior intention to be the embodiment of loyalty. This means a high degree of loyalty will lead to behaviors that meet the expectations of the respondents, while a low degree causes the opposite. Therefore, the connotation of loyalty consists of the levels of loyalty and the behavior intention (Chen, 2009). The levels of loyalty reflect customers' (patients') reliance on and preference for a certain product or service, which has exerted an emotional impact on them. Quantitative evaluation can be conducted to decide the behavior intention through various purchase behaviors and frequencies. Bloemer et al. (1998) regarded

customer loyalty as customers' preference behavior in selecting merchants. The research defined customer loyalty as a kind of behavior. Similarly, Oliver (1999) believed customer loyalty is a kind of behavioral commitment barely affected by the market environment changes and marketing measures. Zeithaml et al. (1996) proposed a connotation framework of customer loyalty, including public praise, willingness to repurchase, price negligence, complaint, and voluntary publicity. In general, behavior intention can be divided into the following categories:

1. Classification according to levels of loyalty level and specific behaviors

The good behavior intention expected by the merchants is the comprehensive embodiment of a high level of loyalty and specific behaviors. From the perspective of repurchase behavior, Dick and Basu (1994) divided customer behavior intention into 4 categories, namely captive, contented, convenience-seeker and committed.

2. Classification according to satisfaction and levels of loyalty

Jones and Sasser (1995) developed the Satisfaction-Loyalty Matrix (MSL) based on the relationship between satisfaction and loyalty, proposing 4 categories of behavior intentions, namely high satisfaction and high loyalty, low satisfaction and low loyalty, low satisfaction and high loyalty, and high satisfaction and low loyalty.

3. Classification according to levels of loyalty

Some scholars believe that loyalty is the fundamental factor in customers' (patients') behavior intention, neglecting the further subdivisions. For instance, Shimp (1997) proposed presenting behavior intention through 3 degrees of loyalty. High loyalty refers to a more than 50% probability of repurchase. For customs with general loyalty, there is a 10%-50% probability that they will repurchase the products or services. Low loyalty indicates a less than 10% probability of repurchase.

Therefore, it is important to measure the behavior intentions when exploring the relationship between loyalty and behavior intention. In order to measure customer behavior intention, scholars divide the behavior intention into different dimensions, as shown in Table 2.6. Generally, the dimensions of behavior intention include recommendation intention, repurchase behavior and premium purchase. Recommendation intention means consumers highly recognize the value and services they purchase and therefore actively recommend it to others. Repurchase behavior indicates that consumers have a positive experience in the first consumption of the product or services and therefore are willing to purchase the same product or services again. Premium purchase means that consumers tend to buy the same product or service even if the price of the product or service is raised. Compared with other service

industries, oral medical service is still in its infancy, so managers of oral medical institutions should pay more attention to the reasonableness of price, good corporate reputation and patients' revisiting rate (Wei, 2018). Based on the analysis results, this research divides the behavior intentions of patients in the context of oral healthcare into three dimensions, that is, repurchase behavior, premium purchase, and recommendation intention.

Table 2.6 Measurement dimensions and item division of customer behavior intention

Author	Dimensions, measurement item division
Fishbein and Ajzen (1977)	Repeat purchase, recommendation, and premium purchase
Mittal and Lassar (1996)	Recommendation intention and transferal intention
Zeithaml et al. (1996)	Loyalty; transfer intention; willingness to pay more; external reaction to problems; internal reaction to problems
Lapierre et al. (1999)	Repeat purchase; recommendation
Cronin and Taylor (1992)	Possibility of repurchasing a certain product; possibility of recommending a product to relatives and friends; I will make the same choice if returning to the past
Haemoon (2000)	Possibility of repurchase; possibility of recommendation; possibility of becoming a frequenter
Backman and Crompton (1991)	Willingness to pay more; willingness to purchase a certain product despite its price hikes; willingness to pay more comparing with other activities; loyalty
Yang (2011)	Reputation promotion and willingness to repurchase
L. H. Yang and Dong (2012)	Reputation promotion and recommendation; revisit intention; customer loyalty, seeking for compensation or lawsuit; transferal behavior; customer complaint or negative reputation promotion

2.4.3 Antecedent variables of customer behavior intention

Researchers studied the antecedents of behavioral intention, mainly from two aspects: multi factor analysis and single factor analysis. The single factor analysis focus on service quality and satisfaction, and analyzes their impact on behavioral intention (Boulding et al., 1993; Oliver, 1999; Zeithaml, 1988; Zeithaml et al., 1996). In order to analyze the weight of different influencing factors of behavioral intention, researchers have studied the antecedents of behavioral intention, which has become the main research direction.

Researchers have established three models of perceived satisfaction, which include the behavioral intentions, customer satisfaction and service quality, as shown in Figure 2.1. Model one believes that service quality indirectly affects behavior intention with customer

satisfaction (Bou-Llusar et al., 2001; Lee & Hwan, 2005; Taylor & Baker, 1994). Model 2 believes that customer satisfaction and service quality both have impact on behavior intention, and satisfaction has a greater impact on behavior intention than service quality (Brady et al., 2001; Cronin & Taylor, 1992). Model 3 believes that both customer satisfaction and service quality have a direct impact on behavioral intention, but service quality also has a significant impact on customer satisfaction (Baker & Crompton, 2000; Pan, 2009; C. X. Wang et al., 2001; Williams, 1989; Xu, 2012; Yi, 2006).

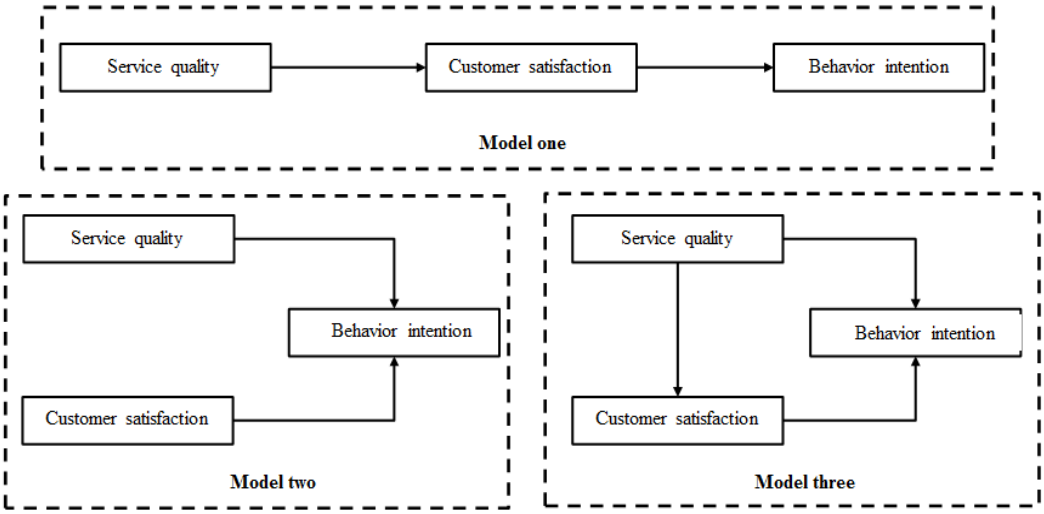

Figure 2.1 Different models of relations among service quality, customer satisfaction and behavior intention
Source: Wei (2018)

Researchers also introduce perceived value into the research of the antecedents of behavior intention, which generates two theories: satisfaction-dominated theory and value-dominated theory. The point at issue is which factor is the direct influencing factor of behavior intention (Dong et al., 1999). There are two satisfaction-dominated models (see Figure 2.2), among which model 1 believes that behavioral intention is most affected by satisfaction, and perceived value has insignificant impact on behavioral intention (Lapierre et al., 1999). In model 2,Haemoon (1999) found that behavioral intention is affected by perceived value and satisfaction, with the latter exerting a greater impact on it than the former.

Similarly, there are three value-dominated models (see Figure 2.2), among which model 3 holds that behavior intention and satisfaction is affected by perceived value; model 4 shows that satisfaction is affected by service quality and satisfaction (Haemoon, 1999); model 5 indicates the relationships between all research variables (Cronin et al., 1997).

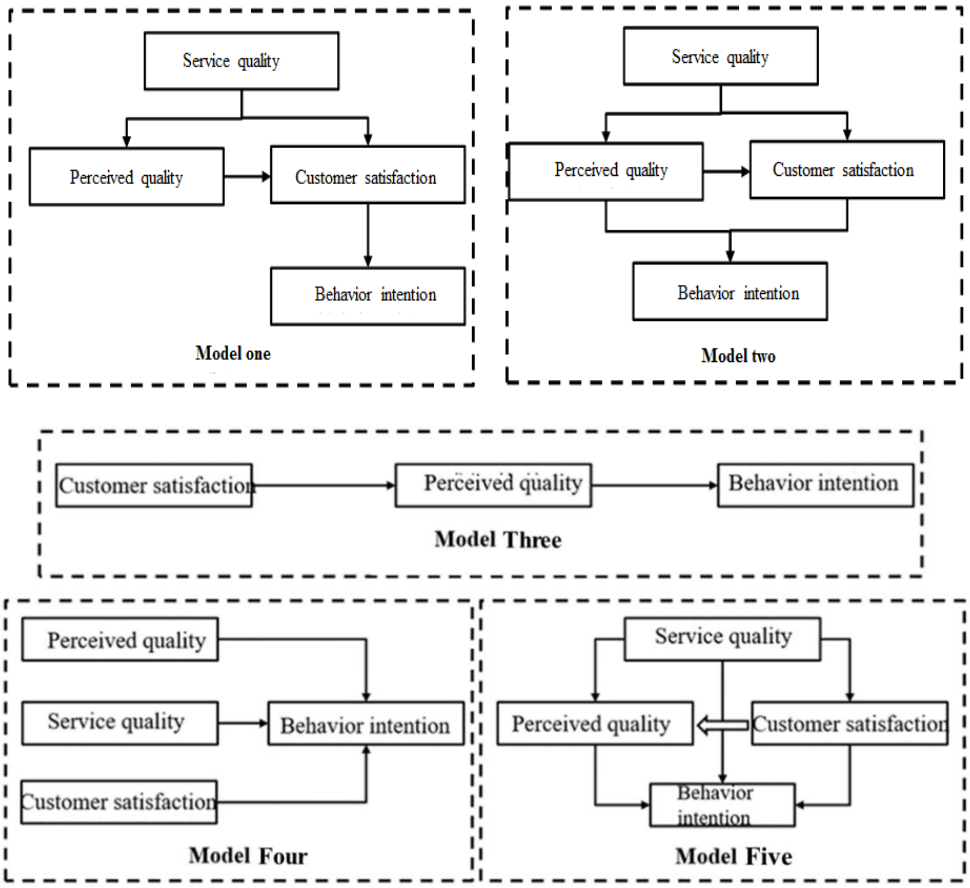

Figure 2.2 Two satisfaction-driven models and three value-dominated models
Source: Wei (2018)

2.4.4 Research on the relationship between perceived service quality, perceived value, customer satisfaction and behavioral intention

Research on the relationship between perceived service quality, perceived value, customer satisfaction and behavioral intentions is explained below:

(1) The relationship between perceived service quality and perceived value

The perceived value is the notion that the value carried by products or services are sensed by consumers and further affect their attitude and behavior intention. The researchers hold similar views on the relationship between perceived value and service quality. It is generally believed that the quality of service has a significant impact on perceived value, but the impact effect varies according to different industries (Backman & Crompton, 1991; Bolton & Drew, 1991; Feng & Duan, 2008; C. X. Wang et al., 2001).

(2) The relationship between perceived service quality and customer satisfaction

However arguments of scholars are divided about the relationship between service quality and customer satisfaction. At present, there are mainly two viewpoints, one believes that

service quality is the antecedent factor of customer satisfaction, which is widely accepted by scholars (Haemoon, 1999; Lee & Hwan, 2005; Pan, 2009; C. X. Wang et al., 2001; Xu, 2012; Yi, 2006; Zeithaml, 1988). Besides, the perceived service quality is affected by service time and cost and attitude of service personnel, service environment and reliability of service; these influencing factors can also affect service satisfaction. Other researchers believe that perceived service quality is most affected by satisfaction (Bolton & Drew, 1991; Oliver, 1999). The view holds that customer satisfaction is determined by the gap between expectations and perceived service, which further affects customer attitudes and the overall evaluation of service quality, as shown in Table 2.7.

Table 2.7 Different opinions on the relations between perceived service quality and satisfaction

	Representative scholars	Major opinions
Customer satisfaction determines perceived service quality	Oliver (1980)	Perceived service quality is an overall evaluation while satisfaction is always linked with specific transactions; the accumulation of customer satisfaction will lead to sound perceived service quality of customer and customer satisfaction.
	Bitner (1990)	Proposing an evaluation model for service quality, proving and supporting the opinion that customer satisfaction leads to perceived service quality
	Bolton and Drew (1991)	A customer's perceived service quality at time t is the function of the residue influence of his perceived service quality last time and his satisfaction at this time
	Woodside et al. (1989)	The customer satisfaction of individual events is the function of service quality of individual events while overall customer satisfaction is the function of overall service quality
	Cronin and Taylor (1992)	Customer satisfaction has significant influence on customers' purchase intention while service quality is the antecedent variable of customer satisfaction; in addition, service quality has weaker influence on purchase intention than customer satisfaction
Perceived service quality determines customer satisfaction	Ostrom and Lacobucci (1995)	Customer satisfaction is affected by not only service quality and product quality but also price, expectations, and situations; customer satisfaction is a broader concept compared to service quality and it has to consider consumers' benefits and sacrifices
	Grönroos (2000)	Customers firstly perceive service quality and then form the perception of satisfaction or dissatisfaction of service quality, rather the other way round.
	Brady et al. (2001)	Discuss the influence of customer satisfaction and service quality on customer behavior intention from the cross-cultural perspective. The results show that no matter what cultural background, perceived service quality affects customer behavior intention, and customer satisfaction can mediates the relationship between behavior intention and perceived service quality.
	Wei (2003)	Customers will be psychologically satisfied only

	when they believe that the service equality provided by enterprises is relatively high and beyond their expectations
Zhang (2005)	By using the data of China's banking industry and adopting stepwise linear regression approaches, the causal relationship between customer satisfaction and perceived service quality is testified, pointing out that customer satisfaction is raised along with the improvement of customer perceived service quality.

According to the literature review, we can see that those researchers who believe that patient satisfaction is the antecedent variable of perceived service quality are on the basis of the following assumptions: patient satisfaction is in response to specific transactions, while the perceived service quality is the overall evaluation of service, which is the accumulation of various kinds of satisfaction. Therefore, the evaluation of satisfaction requires patients to know their instantaneous satisfaction with the service they receive. However, it is difficult for patients to present the "instantaneous" satisfaction while responding to the questionnaire. Besides, patients feel satisfied or dissatisfied only when they are receiving or perceiving services. Therefore, this research agrees with Gronroos believing that the antecedent variables of service satisfaction include perceived service quality, responsiveness, tangibility, empathy, reliability and assurance, which affect service satisfaction. Based on the views of the above scholars, it is generally believed that there is a positive correlation between service quality and customer satisfaction.

(3) Modeling the relationship between perceived value and customer satisfaction

In terms of the relationship between perceived value and customer satisfaction, researchers have two views: one is that if people think that what is gained is more than what is lost, then their expectations are met, which results in high satisfaction (Haemoon, 2000; Martensen et al., 2000; Meng, 2012; Zeithaml, 1988). Since the 1980s, researchers have established customer satisfaction index models which explain the impact path, mechanism and influencing factors of customer satisfaction. Afterwards, scholars across the world have successively constructed the American customer satisfaction index (ACSI), European customer satisfaction index (ECSI), Swedish customer satisfaction index model (SCSB) and some other countries' customer satisfaction index models and verified their applicability.

Since the 21st century, China has constructed the Chinese Customer Satisfaction Index (CCSI) that suits China's conditions. Since 2003, CCSI has been gradually applied to practice (Center for Chinese Enterprise Research of Tsinghua University & General Administration Quality Supervision Inspection and Quarantine of the People's Republic of China, 2003). Fornell et al. (1996) constructed the American Customer Satisfaction Index evaluation model

(ACSI), which has been widely used (see Figure 2.3). ACSI establishes the impact path among research variables. According to the model, perceived quality perception and customer expectations have significant impact on perceived value and further affect customer satisfaction.

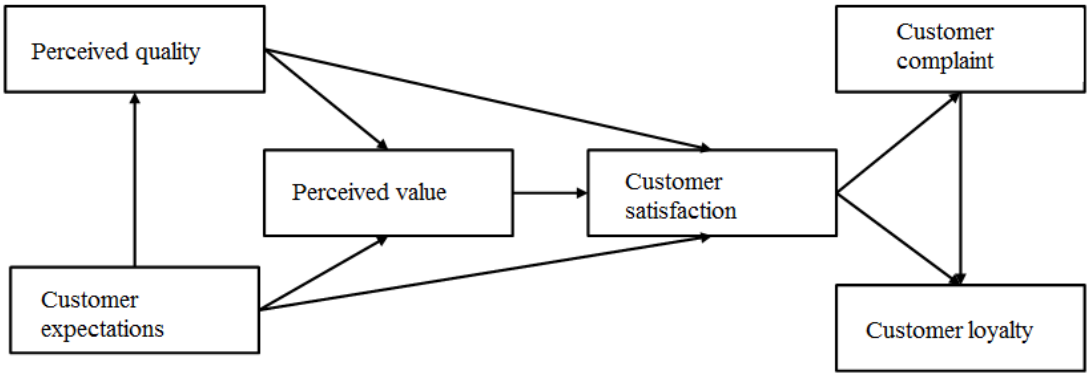

Figure 2.3 American Customer Satisfaction Index evaluation model (ACSI)
Source: Center for Chinese Enterprise Research of Tsinghua University & General Administration Quality Supervision Inspection and Quarantine of the People's Republic of China (2003)

Drew and Bolton put forward that the customer satisfaction after receiving service can form customer perceived value, and satisfaction plays a decisive role in affecting customer perceived value (Bolton & Drew, 1991). Overall, although researchers have different views on the relationship between customer satisfaction and perceived value, the first view has been widely recognized by them.

Figure 2.4 shows the customer satisfaction index model (ECSI) constructed by European researchers. This model is basically similar to the model constructed by American researchers in terms of foundations and concepts. It also includes customer expectations, perceived value, perceived quality, customer satisfaction and customer loyalty but eliminates the customer complaint as a latent variable in ACSI model because many countries already have sound customer complaint systems (Martensen et al., 2000).

In order to make it perform well, researchers introduce enterprise image as a latent variable into ECSI model. Enterprise image refers to the impression and the opinion that people have about an enterprise, which can affect the customer's expectation and satisfaction. Since the end of last century, ACSI model has measured the relationship between different research variables and ECSI model divides perceived quality into the evaluation of product quality and service quality (Martensen et al., 2000).

Based on the above analysis, this research will study the relationship between perceived value and patient satisfaction based on the ECSI model, and then analyze the impact mechanism of research variables on behavior intention of patients.

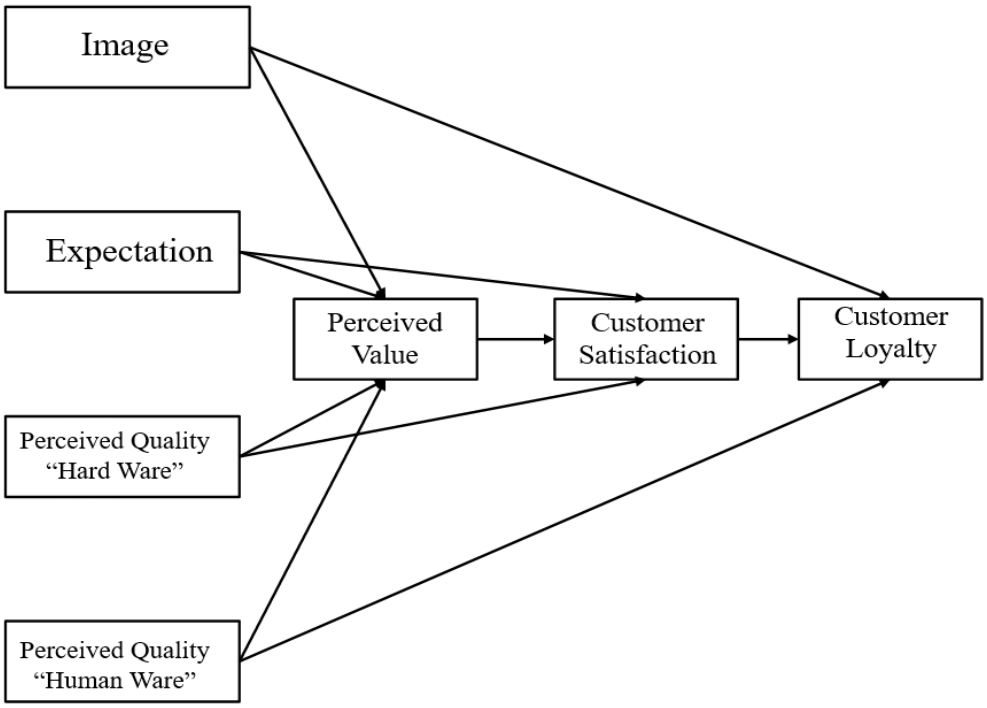

Figure 2.4 European customer satisfaction index model
Source: Martensen et al. (2000)

(4) The relationship between customer satisfaction and behavior intention

Many scholars pointed out that the customer's satisfaction with the service received can determine the customer's future behavior intention (Bitner, 1990); Jones and Suh (2000) found that customer satisfaction directly affects whether customers will repurchase the service again. (Murray & Crilley, 1999) studied the sports and leisure field and pointed out that recommendation intention and customer satisfaction are closely and positively correlated. Chen and Tsai (2007) studied the impact of satisfaction with tourist attractions on tourists' behavior intention. Bao and Hu (2008) empirically analyzed and verified the relationship between satisfaction, recommendation intention and repurchase intention and found they are positively correlated..

Severt et al. (2007) found that the Expo participants' satisfaction with the Expo service providers largely determines whether they will participate in the Expo again and actively recommend the Expo to others. Therefore, it is necessary to measure the Expo participants' satisfaction in order to improve the quality of the exhibition. N. Zhang et al. (2011) empirically studied the trade and investment exhibitions and found there is close relationship between participant loyalty and satisfaction. Shelby and Heverlein (2003) found that if customers are not satisfied with the services received, they will show negative emotions and feelings that lead to their intention never to repurchase the services again in the future

Most of past research focuses on the significant positive correlation between customer satisfaction and behavioral intention, which has laid the basis for the hypothesis of this research. This research hypothesizes that there is a positive correlation between the satisfaction of patients in dental institutions and their behavioral intention.

(5) Relationship between customers' perceived service quality and behavior intention

Although researchers basically hold identical views on the relationship between customer behavior intention and perceived service quality, there are still some disagreements. On the one hand, they all agree that perceived service quality has a significant and positive effect on behavior intention. But opinions are divided as to how perceived service impacts behavior intention. Some believe that perceived service quality has a direct effect on behavior intention, while some researchers insist that perceived service quality indirectly influences through mediating variable (see Table 2.8).

Table 2.8 Different opinions on the relations between perceived service quality and behavior intention

	Representative scholars	Major opinions
Indirect effect	Brady et al. (2001)	Perceived service quality is the antecedent variable of customer satisfaction and influences behavior intention through customer satisfaction
	Lee and Hwan (2005)	Perceived service quality exerts important influence on customer behavior intention through customer satisfaction
	Q. Zhou and Li (2011)	By surveying consumers in several fitness clubs, it is found that perceived service quality indirectly affects behavior intention through consumer satisfaction
Direct effect	Boulding et al. (1993)	Perceived service quality is an antecedent variable of customer behavior intention and directly affects customer behavior intention.
	Cronin et al. (1997)	Through the research on six industries, it is found that perceived service quality and customer behavior intention are directly related
	C. X. Wang et al. (2001)	Perceived service quality has positive and direct influence on customer behavior intention

Based on the above analysis, although scholars proposed the satisfaction-dominated and value-dominated theories because of differences in research purpose, variable concept and research objects, most of them agree that perceived value has a certain impact on customer satisfaction. Therefore, the research constructs research model based on satisfaction-dominated theory and examines the correlation between the research variables.

2.5 Patient participation

2.5.1 Relevant definition of patient participation

The remarkable difference between oral health services and other service sectors lies in the necessity for patients' cooperation and even participation in oral treatment. Excellent solutions will fail to produce good results without patients' cooperation. Unsatisfactory experience for patients will lead to a decline in the perceived service quality. The patient participative behaviors formed in the process of patients' participation in treatment will have an impact on the perceived service quality, perceived value, and patient satisfaction. Patient participation, as a specific example of the customer participation concept in the field of medical services, is subordinate to customer participation.

Nowadays, domestic and foreign researchers have taken patient participation into consideration as an important factor when conducting research on patient satisfaction. However, there is still divergence in research results and philosophy, which is manifested in the following two aspects. On one hand, some scholars classified patient participation as a concept of behavior. From the perspective of behavior, they defined patient participation as all resources and actions during medical treatment, including time, thinking, mood, and energy (Geng, 2008; W. B. Liu et al., 2009; Saunders, 1995).

Another mainstream idea is based on the results. The scholars paid less attention to the process of patient participation and evaluated the patients' participation only from the perspective of the participation effects. When patients get more deeply involved, they can receive better perceived service quality and feel more mentally satisfied in the process of treatment. For some patients with severe oral diseases who have a strong demand for participation in diagnosis, decision-making, and treatment, they may also express their gratitude towards medical staff even without ideal therapeutic effects if they feel fully respected. To a certain extent, patient participation means responsibility sharing (Claycomb et al., 2001; Lloyd, 2003).

According to the above analysis, despite the differences in the perspectives of research and the understanding of the concept of patient participation, scholars share the same focuses on the research, including the patients' mental and physical efforts and the breadth and depth of their participation in the treatment. In terms of breadth, the focuses of the research will be expanded from service delivery to the processes before and after service delivery. As for depth, more factors should be taken into account for patient participation in a certain link.

In this research, the author believes the first interpretation is more convincing. Specifically, in oral healthcare, the definition of patient participation should include patients' contribution of all possible resources, both materially and mentally. The more patients devote, the more deeply they get involved.

2.5.2 Dimensions of patient participation to be considered

Given the few studies on patient participation and the inconsistent readings of the definition, the dimensions of patient participation to be considered also vary as follows.

Silpakit and Fisk (1985) believed the measurement dimensions of customer (patient) participation included physical strengths, spirit, and emotion.

Bettencourt (1997) thought the measurement dimensions of customer (patient) participation included loyalty, cooperation, and information sharing.

Ennew and Binks (1999) regarded the measurement dimensions of customer (patient) participation as information sharing, responsibility behavior, and interpersonal interaction.

Lloyd (2003)measured customer (patient) participation through 3 dimensions, namely the efforts, perception of work, and information acquisition.

Hsieh and Chang (2004) believed the measurement dimensions of customer (patient) participation covered preparations (information or tools), the establishment of trust relationships, information exchange, and interaction with medical staff.

Geng (2008) thought the measurement dimensions of customer (patient) participation included interpersonal interaction, information acquisition, and behaviors representing the responsibilities for doctors and patients.

Peng (2010) believes that the measurement dimensions of customer (patient) participation include advance preparations, information sharing, cooperative behavior, and interactive behavior based on interpersonal relationships.

T. H. Guo and Tang (2011) believes that the measurement dimensions of customer (patient) participation include patients' cognition of doctors' work and possible treatment, the acquisition of relevant information, cooperative actions (efforts) for treatment, and interaction behaviors based on interpersonal relationships.

Guo (2014) believes that the measurement dimensions of customer (patient) participation include advance preparations, cooperative actions (efforts) for treatment, and publicizing actions by customers (patients) for treatment services (institutions).

Comprehensively teasing out the above mentioned studies, this research concludes that the aforesaid responsibility behavior is the action (effort) taken to be cooperative in the treatment, namely, the responsibilities and related behaviors of patients, direct participants in diagnosis and treatment, for the best therapeutic efficacy. Information sharing resembles information acquisition and information exchange, referring to the sufficient communication between patients and medical staff. Patients can take the initiative to inform medical staff of their conditions (cases, state of illness). Meanwhile, patients can obtain treatment-related knowledge, information, and conditions smoothly from medical institutions or via other channels. Loyalty and actions to advertise treatment services (institutions) are post-treatment participation behaviors of customers (patients).

Academically, the views of Ennew and Binks (1999) are widely supported. This research intends to summarize the above research results based on the standpoints of Ennew and Bink, and examine the dimensions of information sharing, interpersonal interaction, information searching, and responsibility behaviors while taking into account the characteristics of dental medical services. During questionnaire surveys and follow-up concrete analysis, however, this research, backed by research fruits of other scholars, takes patient participation as a moderating variable merely, whose impacts on any dimension are not deeply studied.

2.5.3 Relationship between patient participation and other variables

Regarding the definition of and dimensions concerning patient participation, preceding scholars proved through empirical analysis that patient participation is highly pegged to the quality of services provided by service institutions, but they were split in conclusions. Some believe that if customers (patients) obtain a certain amount of treatment information with their own efforts or through corresponding actions before treatment, and actively interact with medical staff during the treatment, they have a higher degree of participation, which results in a stronger sense of control, satisfaction, and immersion in the treatment process. Such patients are likely to give better reviews and receive services of better quality (Ennew & Binks, 1999; Guo, 2014; T. H. Guo & Tang, 2011; Saunders, 1995).

While some scholars believe that in-process participation transforms customers (patients) from pure service recipients into part of the interaction in services. The sense of participation functions prominently in customer (patient) participation, satisfying their psychological needs. Without participation, customers (patients) will stand aside in the service process and think opposite to service providers, tending to blame service providers for any problem that occurs.

As a result, perceived quality drops amid incomprehension and contradiction, which is manifested in the medical service system as conflicts between patients and doctors (Han & Feng, 2012; Lloyd, 2003; J. X. Wang & Sun, 2012).

Since the 1880s, with the rapid development of the service industry (the tertiary industry), a large number of scholars have discussed and studied the relationship between customer (patient) participation and satisfaction, and presented conclusions consistent with the above viewpoints- the more deeply involved, the stronger sense of participation, gain, and satisfaction customers (clients) can feel, thereby enhancing overall satisfaction. At the same time, customers (patients) naturally share a portion of responsibility when they take part in the service process. In that case, customers (patients) incline to associate the reasons of satisfaction and dissatisfaction to themselves and thus establish positive connections between the perceived value of services and customer (patient) satisfaction (Ennew & Binks, 1999; W. B. Liu et al., 2009; Lloyd, 2003).

Some other scholars carried out more scientific research. They split the impacts of customer (patient) participation in a more detailed manner and explored the impact of a single dimension from different angles. They denied the direct influence of participation degrees on customer (patient) satisfaction, holding that participation degrees sway final satisfaction by having an influence on intermediate variables including behaviors, emotions, and perceived values. Some scholars, based on empirical analysis, are even of the opinion that customer (patient) participation is irrelevant to other variables (perceived quality of services, satisfaction) (File et al., 1992; Geng, 2008; Peng, 2010).

To sum up, this research sees oral medical service as a face-to-face service demanding highly cooperative patients. The degrees of customer (patient) participation should be fully considered for the following reasons. First, dentists must know well about the information and medical histories of their patients before devising more accurate and rational plans for diagnosis and treatment. Second, external factors like word of mouth, prices, and environments come into patients' opinions. Excessively high prices or negative news about medical institutions stir patients' negative thoughts before their treatment and aggravate their dissatisfaction during the treatment. Last but not least, information transparency and smooth communication can establish mutual trust between doctors and patients and annihilate patients' illusion that they are deceived. That's why this research studies and analyzes patient participation as a moderating variable for perceived value and patient satisfaction.

2.6 Relevant theories and concepts regarding perceived service quality, satisfaction, and behavioral intention

2.6.1 Customer satisfaction theory

In the 1960s, Cardozo (1965) constructed customer satisfaction theory and afterwards different scholars defined customer satisfaction from different perspectives. Oliver (1980) defined satisfaction as the gap between customer's expectations and the perceived service quality. Bolton and Drew (1991) found that customers' emotions change before and after consumption has a direct impact on behavior intention and repurchase intention. Scholars have established their own theoretical models concerning customer satisfaction according to different impact paths and mechanism and the widely accepted include customer satisfaction index model, emotion model and expectancy gap theory.

(1) Connotation of customer satisfaction theory

The research on customer satisfaction has lasted for about six decades, bringing out plentiful literature and fruits. At present, the research is oriented towards how customer satisfaction theory is practiced in various fields, now that in-depth and all-sided studies have been conducted on topics like the design and development of satisfaction models, the holistic evaluation of customer (patient) satisfaction, the value and significance of the research of customer (patient) satisfaction, and the relationship between satisfaction and behavioral intentions. Despite numerous studies on the theory, a commonly recognized definition of customer (patient) satisfaction has yet to come into being. The understanding of customer (patient) satisfaction varies among a diversity of literature, leading to differences in research perspectives, dimensions, and methods, and consequently making research results less comparable. This research systematically sorts out the core of itself- the concept and connotation of the customer satisfaction theory.

Bither et al. (1971), one of the first researchers of the theory, see customer satisfaction as a perception resulting from the comparison between sacrifices and gains by customers. Olson and Dover (1976) defined customer satisfaction as the disparity between customers' expectations and actual services. In the view of Hunt (1977), satisfaction is a reflection of emotions, featuring randomness, mirroring how much actual products and services live up to expectations at that moment. Westbrook and Oliver (1991) learned from their research that besides reflecting cognition, customer satisfaction expresses post-consumption emotions and, therefore, can be swayed by feelings at the time. In fresh research, Giese and Cote (2009)

broke with the direct presentation of the customer satisfaction concept. Instead, they set up a conceptual framework to scale down the scope and determine the meaning of satisfaction. They believed customer satisfaction shall be defined from three perspectives, namely the categories and intensity of customers' feelings at the time, the comparison standards of customer satisfaction, and the objects and scopes of customer satisfaction.

Building on the aforementioned analysis, this research lists the features of customer satisfaction as follows.

1. Customer satisfaction represents the combined cognition of customers' perceived quality (of products or services) and external factors including environments and prices.

The quality of products and services (internal factors) and prices (external factors) form the fundamental causes for customer (patient) satisfaction (Churchill & Surprenant, 1982). Economics holds that in the course of consumption, customers feel the perceived quality of products and services at the cost of time, money, and energy. Customers' expectations, abstract but well-founded, are based on what has been spent and what is predicted to be spent. According to the "hypothesis of rational man", customers (patients) have their expectations come from something in existence.

2. Customer satisfaction can be swayed by emotional factors on the foundation of comprehensive cognition.

As a rule of thumb, people learn with a shift from rationality to perception. The aforesaid research revealed that initially, customer satisfaction research was done from a cognitive perspective, regarding customers as rational men who rarely change initial expectations and can objectively comment on products and services provided by merchants. Therefore, researchers worked out satisfaction levels through the comparison between expectations and perceptions. With the research going deeper and being enriched by factors deserving consideration, however, researchers found that customer satisfaction is a combined result of cognition and emotional experience. And emotions even outweigh cognition as an affecting factor of satisfaction. Customers in a good mood tend to be satisfied even when the perceived quality of products and services falls short of expectations. Even if the perceived quality proves rather poor, customers will refocus their attention on satisfactory dimensions, convincing themselves to show their satisfaction. For example, a customer valuing product quality may still speak highly of bad-quality products for satisfying prices when he feels light-hearted. In contrast, customers in a bad mood are likely to make negative comments on merchants, though served with products and services far better than the average. In the medical sector particularly, uncomfortable patients may lose their temper or become enraged

even though medical practitioners show better attitudes than they usually do when providing services.

3. Customer satisfaction evaluation shall be systematic.

Customers' internal evaluation systems are intrinsically systematic, involving the quality of products or services, prices, environments, the attitudes of receptionists, and other dimensions. Customer satisfaction cannot be evaluated from a single angle because final customer (patient) satisfaction is susceptible to all links before, during, and after consumption. Hence, the research on satisfaction should start with the determination of research scopes, with the sort-out of numerous factors of customer (patient) satisfaction as the next step.

4. Combine qualitative and quantitative methods of research.

Customer satisfaction, as a subjective feeling, can be shown quantitatively via questionnaires but proves impossible to be detailed based on a single quantitative indicator, not to mention the possible inability of respondents to either know well about or elaborate on their satisfaction evaluation systems. In addition, it may be hard for scholars to accurately grasp the intentions of customers (patients) in concrete scenarios for all the time-tested classic questionnaires they adopt. Seeing things from cognition, customers' expectations vary rapidly, causing fluctuations of the cognition of customers (patients) of products or services. From the perspective of emotional analysis, emotions cannot be precisely described. Besides, the majority, especially those without special training, can hardly find themselves positive or negative when they are at the mercy of emotions, let alone expound their feelings via languages or other tools. That means research on satisfaction should combine qualitative and quantitative methods and deliver comprehensive conclusions through vagueness processing.

5. Customer satisfaction is a subjective issue whose objective rules should be explored through research.

As a subjective issue, customer satisfaction is closely related to customers' (patients') personal situations. Research on customer satisfaction aims to discover common rules in customers' (patients') subjective expressions. Based on the analysis of the aforesaid scholars' research results, there exists some consensus among scholars today. For instance, the evaluations of a specific product/service by a comparatively fixed customer group tend to be of an average value. Despite abnormal deviation from the average value or even apparently opposite results occasionally, most customers' evaluations of the general satisfaction tend to converge (Li, 2008; Liu, 2006). From the emotional perspective, people share a similar emotion generation mechanism. They laugh about comedies and cry for tragedies at varying degrees. Therefore, customers (patients) present similar emotional perceptions of the specific

product/service. In conclusion, the internal rules on the objects and content of this research can be identified through specific tools and methods.

(2) Influencing factors of customer satisfaction theory

Research on customer satisfaction theory takes a long time and involves diverse influencing factors, mainly including expectations, perceived quality, perceived value, emotion and service fairness.

1. Customer expectations

Customer expectations serve as a classical dimension in satisfaction research. Parasuraman et al. (1985) (PZB Theory) defined customer expectations as customers' desires and demand, and their ideas of the products or services that product or service providers "should" provide for them. A bit straightforward as the concept proposed by PZB Model may be, it defined the scope for subsequent research. But in terms of the specific operation, the PZB model changed the "should" in the concept into "would" to show respect for the research objects on the one hand and the difficulty in a precise grasp of expectations on the other.

Oliver (1980) systematically analyzed the research on customer expectations and proposed specific models to present the uncertainties as to expectations in customer satisfaction and attribute the varying degrees of satisfaction to the results of the comparison between expectations and perceived quality. Customers feel satisfied when the perceived quality is beyond expectations and unsatisfied if the perceived quality is below expectations. They cannot tell exactly whether they are satisfied or not when the perceived quality comes up to their expectations.

As the research proceeds, customer expectations become more indescribable and immeasurable. This research holds that when filling in the questionnaires, patients have taken their expectations into consideration. Take the item that "the attending doctor can describe my illness conditions precisely" as an example, patients' reading of the word "precisely", which is prone to be impacted by their expectations, will inevitably affect their answers. Hence this research sets no specific questionnaire items to study patient expectations.

2. Perceived quality

Further discussion is omitted here as Section 2.1 has presented a detailed analysis of the literature research on perceived quality. Like expectations, perceived quality is also a direct factor that determines customers' (patients') satisfaction. During the concrete operations of the research, perceived quality can be more easily captured and described by customers (patients). But generally, the described results have contained the results of a comparison with certain "standards", which should be the customers' (patients') expectations.

3. Perceived value

Section 2.2 of this thesis has presented a detailed introduction of this factor. Further discussions on relevant research by Zeithaml (1988) will be made here as most researchers support Zeithaml's conclusion that customers' perceived value has a direct impact on their satisfaction (Zeithaml, 1988). Zeithaml defined customers' perceived value in the form of framework, namely, value is equal to low prices; value is manifested in the products/services' capability to satisfy customers' (patients') demand; value is a comprehensive embodiment of perceived quality and customer prices; value is also a comprehensive representation of customers' (patients') effective yield and efforts.

China Customer Satisfaction Index also defined the perceived value as the subjective evaluation and feelings of users after a comprehensive assessment of the quality and prices of the products/services (The Center for Chinese Enterprise Research of Tsinghua University, and General Administration Quality Supervision Inspection and Quarantine of the People's Republic of China, 2003). In most of the aforesaid research, perceived quality and perceived value are mutually affected in connotation. Therefore, during the research, it is difficult to differentiate and design questionnaire items of perceived quality and perceived value.

4. Emotion

Emotion, also known as consumption emotion, is one of the major factors for research on customer satisfaction nowadays. Though the previous models based on perceived quality have been widely accepted, as mentioned above, customers' (patients') satisfaction is a result of the interaction between perception and emotion. More and more scholars agreed on the need to incorporate emotional factors in the previous model (Wirtz et al., 2000).

Dubé and Menon (2000) modeled customers' (patients') perceived value, emotional factors, and satisfaction to explore the relationship between emotion and customer (patient) satisfaction. They held that satisfaction is evaluated based on perceived value in combination with emotional factors. Krampf et al. (2003) also conducted an empirical analysis of perceived quality, emotion, and customer satisfaction, verifying the role of emotion in the evaluation of customer (patient) satisfaction. The level of perceived quality decides the impact of emotion on customer satisfaction. The better the perceived quality is, the more influential emotion is, while the effects of emotion would be weakened by poorer perceived quality.

5. Service fairness

Customers (patients) would make a horizontal comparison when purchasing a product/ service. Hence, during the evaluation of customer satisfaction, it is necessary to take the fairness factor into full consideration and assume that the research is conducted in a

comparatively fair environment. Otherwise, an unfair environment would influence customers' (patients') satisfaction evaluation. Generally, service fairness can be separated into procedural fairness, result fairness, price fairness, and transaction fairness. For medical services, the intangibility of service fairness would increase risks to patients' consumption. Considering the public welfare nature of the medical industry, in particular, service fairness becomes more significantly important. Medical staff's favoritism during treatment could provoke patients directly, resulting in conflicts between doctors and patients. Research on fairness in China is still at its initial stage (Seiders & Berry, 1998).

2.6.2 Expectancy gap theory

Expectancy gap theory, also known as the expectation disparity theory, holds that that the customer satisfaction is based on the comparison of customers' expectations and their perceived performance ratings. If the products and services have met or exceeded customers' expectations, the customers will be satisfied; otherwise, the customers feel dissatisfied when a product or service performs more poorly than expected. When the perceived service quality is equal to the expected service quality, it is uncertain whether customers feel satisfied or not.

Expectancy gap theory, also known as the "effect value-behavior pattern-expectation theory", was proposed by Victor Vroom (1964) in his book *Work and Motivation*. It proposed the core formula:

$$\mathbf{M} = \sum \boldsymbol{V} \times \boldsymbol{E} \tag{2.1}$$

In the formula, M refers to stipulated motivation, the ability of each person to be stipulated. V refers to the value of realizing goals for each person, and E refers to personal expectations, which is the same as the aforesaid expectations. The formula shows that both the realization of goals and personal expectations play an important role in motivating an individual's ability. Focusing on the relationship among motivation, expectations, and behavior, the theory, as in-depth research on customer satisfaction, further presents the methods of stimulating the customers (patients) and product/service providers based on the study of the relationship between perceived quality, perceived value and satisfaction.

Based on the model of expectancy theory, Vroom proposed the basic pattern of a person's realization of his expectations:

A person's efforts can bring personal achievements, which are then presented by awards (different kinds of rewards) given by organizations. Individual needs can be satisfied on the basis of obtaining rewards.

This chain facilitated the transition from personal efforts to personal satisfaction. The aforesaid basic model requires the exploration of the relationships among multiple variables, such as the relationship between personal efforts and achievements. This relationship is obviously prone to the influence of personal expectations, which are directly or indirectly impacted by the person's goals, cognition, emotion, thinking patterns, belief models.

It is difficult to measure the relationship between efforts and rewards, since this relationship is prone to the influence of external factors, such as the incentives given by employers, average incomes in the industries, rather than decided by individuals. In the exploration of the relationship between these two factors, individuals mainly get motivated through adjusting their expectations.

When exploring the relationship between rewards and the satisfaction of personal demand, scholars focused on the forms of rewards. Demand varies from person to person. Some care about money, some reputation, and some self-realization. Meeting personal demand is the most operable link in employee management and self-management. Thus, managers can set targeted incentive mechanisms for some important employees.

How to transform the satisfaction of personal demands into motivation for persistent efforts is the essential topic in Vroom's research on expectancy theory. According to the analysis of the formula and the aforementioned relationships, motivation can be improved through three aspects. Firstly, conditions should be provided, from the perspectives of both individuals and the working environment, so that a person can make greater achievements out of the same efforts. Secondly, employers should properly raise rewards and enrich the forms of rewards for employees according to key personal performance. Despite its contributions to motivating people, this method should be used in designated key links, instead of being used continuously, because people’s expectations grow along with the increased rewards. Lastly, management personnel should accurately grasp the types and levels of different people’s demand to take targeted incentive measures and maximize the incentive effects.

Regardless of the difference in the focus of the expectancy gap theory from this research, the expectancy gap theory definitely provides directional guidance for this research. For example, based on analysis of the perceived quality, perceived value, satisfaction, and behavior intention, this research studies how to improve patients’ willingness to revisit, mobilize patients to publicize medical institutions, and motivate staff of those medical institutions to improve their performance. The analyses and suggestions in Chapter 6 of this thesis are all provided by the combination of the research results and the expectancy gap

theory. The analysis and suggestions aim to help medical institutions obtain maximum profits by combining their own types of business with customers' (patients') demand.

2.6.3 Two factor theory

Motivation-hygiene theory, also known as two-factor theory, was proposed by Herzberg in the 1950s, who introduced the theory into the management field to guide the daily management activities. The motivation-hygiene theory includes hygiene needs and motivator needs. The hygiene needs which, when not met, cause us to be dissatisfied. But meeting these needs does not make us satisfied. The motivator needs are a separate set of needs which, when resolved, do make us satisfied (Daft & Marcic, 2014; Herzberg, 1993).

When the hygiene needs of employees are not met, they will show slack behaviors, negative emotions and even antagonistic behavior. Meeting the hygiene needs can improve employee satisfaction and prevent negative emotions and behaviors. However, meeting the hygiene needs does not directly contribute towards stimulating employees' work enthusiasm. When the hygiene needs are not met, employees feel dissatisfied, but when the hygiene needs are met, employees are probably neither satisfied nor dissatisfied. Motivating factors will have a more positive effect on employees' emotions. If the motivator needs are satisfied, employees will feel highly motivated and work very well; when motivator needs are not satisfied, employees feel dissatisfied at worst rather than show negative emotions and behaviors (Daft & Marcic, 2014).

According to Herzberg's two factor theory, meeting motivator needs can stimulate employees' work enthusiasm, while failure to meet the hygiene needs will result in the passive attitudes and behaviors of employees. Therefore, how to deal with the hygiene needs and motivator needs according to the actual situation is often the priority of management activities (Daft & Marcic, 2014).

2.6.4 Basic concepts in this research

There are three basic concepts discussed in this research:

(1) Dental outpatients

Unlike general hospitals, the dental hospitals mainly provide outpatient services (W. X. Li & Yang, 2006), there are rare cases of critical patients who need hospitalized treatment. For example, the outpatient visits of the surveyed hospital in this research account for over 95% of its total dental services in 2019. The surveyed patients in this research have a clear cause of

disease, disease condition and past medical history. They expect effective treatment methods with quick effect without long-time waiting. Their oral diseases mainly include children's oral diseases, oral mucosal lesions, deformed tooth alignment, tooth loss requiring dental implant treatment or restoration treatment, periodontal diseases, dental pulp lesions, and tooth extraction.

The research objects in this research are only limited to the outpatient patients in the surveyed dental hospitals excluding hospitalized patients.

(2) Patient satisfaction

Customer satisfaction is generally used to measure the satisfaction of customers, while patient satisfaction is used in the medical field. Researchers believe that patient satisfaction is the patients' evaluation of whether the medical services have met their expectations. Therefore, this research defines patient satisfaction as the result of comparison between patients' expectations of service quality and the actual perceived service performance.

(3) Patient participation

Patients have the right to know the medical process and treatment effect, and doctors also need the cooperation of patients for treatment. Therefore, this research defines patient participation as the moderating variable that may have an impact on patients' perceived value. This research will explore whether patients' participation will have an impact on perceived value and further the behavioral intention of patients.

2.7 Chapter summary

Based on the two factor theory and the collected data, this research hypothesizes that patients' perceived service quality has impact on patient satisfaction. Then can the influencing factors of patients' perceived service quality be divided into motivating factors and hygiene factors? The research of patients' perceived service quality based on the two factor theory is meaningful for the improvement of service quality.

This research classifies the types of the perceived service quality based on the two factor theory, and analyzes how patients' perceived service quality affects their satisfaction, and based on which work out measures to improve the perceived service quality.

Chapter 3: Model Design and Research Hypothesis

3.1 Model design

According to the research purpose and main content of this research, the literature review in Chapter 2 presents the definition of research variables and the relationship between these variables. Besides, the dimensions of some variables and principle of dimension division are elaborated. Based on the existing research findings and actual research context, the research explores the relationship between research variables and impact mechanism, constructs research model and puts forward research hypotheses.

Since 1980, researchers have paid great attention to service quality and conducted a lot of research (Abby et al., 1984; Grönroos, 1993; Parasuraman et al., 1985). According to research from various countries in the world, there is a significant correlation between behavioral intention, customer satisfaction, perceived value and service quality. However, researchers have different opinions on how to set specific variables and what the mutual influence of variables is.Therefore, it is necessary to empirically explore the relationship between the research variables and impact mechanism in medical context.

According to the literature review in the second chapter, researchers generally believe that service quality has a significant impact on customer satisfaction and perceived value. Based on the satisfaction-dominated theory believing satisfaction has significant impact on customer behavior intention, this research constructs the research model regarding the correlation between different variables in the medical context and meanwhile explores how service quality directly affects behavior intention. The hypotheses in this research are based on widely accepted views and theories. The dimensions of variables in the model are selected according to the research needs and industry characteristics. The theoretical model is shown in Figure 3.1.

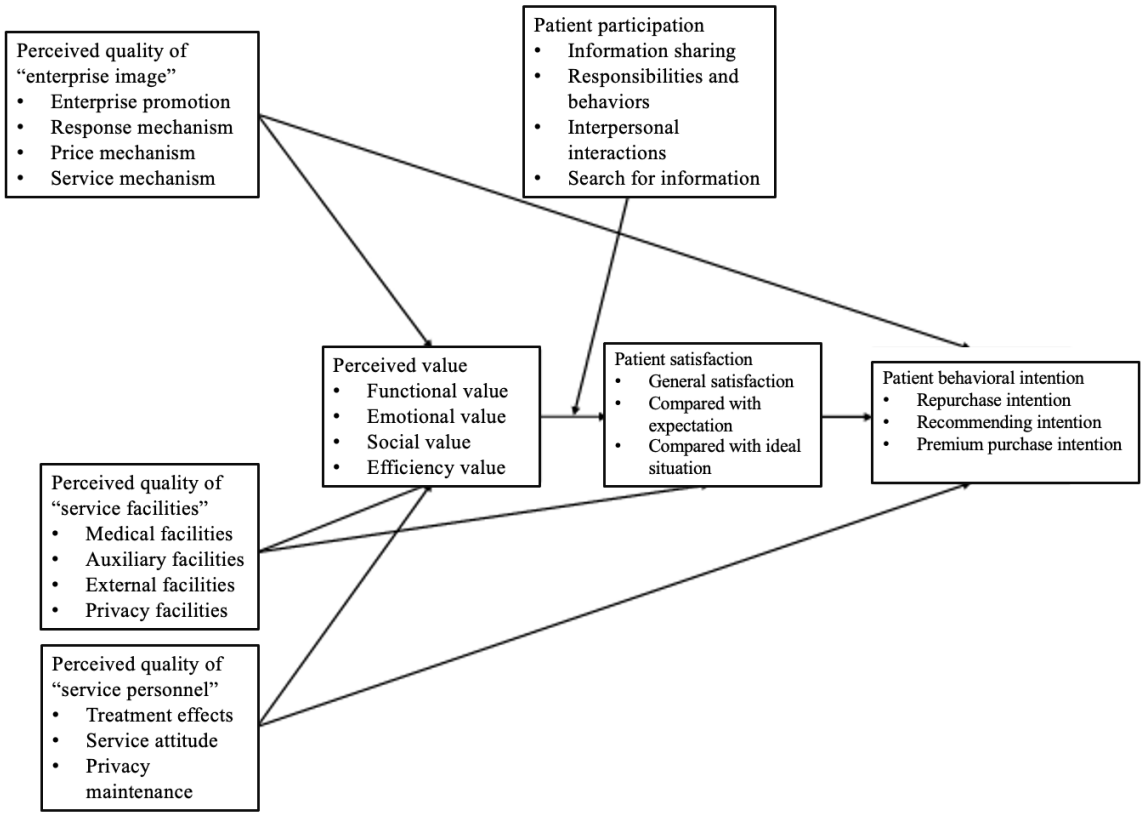

Figure 3.1 Research model in this research

Based on the ECSI model, this research constructs the research framework. According to the research purpose of this research, the five dimensions of SERVQUAL model are integrated into the three variables (i.e. enterprise image, medical facilities and medical personnel), and the patient participation as moderating variable is introduced to explore the moderating effect of patient participation on perceived value and patient satisfaction. The perceived value is analyzed from four perspectives and the patient satisfaction is analyzed from three perspectives respectively. The behavior intention is analyzed from three perspectives.The research sees things in a holistic manner instead of breaking the research subject down into numerous dimensions for analysis. Behavioral intention, as a dependent variable, is measured as a whole from three aspects.

3.2 Research hypotheses

According to the constructed theoretical model and the research purpose of this research, the research hypotheses are proposed.

3.2.1 Hypothesis about direct impact

From Figure 3.1, there are eight hypotheses about direct impact in this research

(1) Perceived quality and perceived value

A large number of studies show that perceived service quality has a positive impact on perceived value (Backman & Crompton, 1991; Feng & Duan, 2008; Gao, 2016; Haemoon, 2000). With the rising of consumption awareness, people no longer only pay attention to the treatment results, but also care about both the treatment outcome and process. Therefore, sound supporting facilities, excellent service attitude and standard service process will bring a more positive experience to patients. This research evaluates the service quality from enterprise image, medical facilities and medical personnel and therefore there are three types of hypotheses.

H1: The enterprise image of dental institutions has a positive direct impact on perceived value.

H2: the medical facilities of dental institutions have a positive direct impact on perceived value.

H3: the medical staff of dental institutions has a positive direct impact on perceived value.

(2) Perceived value and patient satisfaction

Whether people are satisfied with service or product is influenced by many factors, but perceived value has a significant impact on satisfaction. The researchers have verified their impact mechanism from multiple perspectives (Haemoon, 2000; Parasuraman et al., 1988; Woodruff & Gardial, 1996).

The patient satisfaction is an overall evaluation of the treatment effect compared with time, energy and costs spent. Therefore, the hypothesis is as follows.

H4: perceived value has a significant positive direct impact on patient satisfaction in dental institutions.

(3) Patient satisfaction and perceived quality

The perceived service quality is affected by many factors. If people have favorable opinions on the service received, they will give a positive evaluation of the service or the organization offering the service (Cronin & Taylor, 1992; Pan, 2009; Parasuraman et al., 1988; C. X. Wang et al., 2001).

The researcher firmly believes that the gap between patients' expectation and actual perceived service performance has a significant impact on patient satisfaction. If the services have met or exceeded patients’ expectations, the patients will be satisfied; otherwise, the patients will experience negative feelings and even badmouth the hospital. Therefore, the following hypothesisis proposed.

H5: the medical facilities of dental institutions have a positive direct impact on patient satisfaction.

(4) Patient satisfaction and behavioral intention

Customers will compare the expected service with the actual perceived service, and then make the evaluation of the service quality. If the gap is small, or the service has exceeded expectations, customers will have the intention to purchase the service again and recommend it to others and even purchase it even though there is a small increase in price (Bolton & Drew, 1991; Parasuraman et al., 1988; Xu, 2012; Yi, 2006).

Patients will evaluate the medical service received according to their actual feelings and further decide whether to consume it again or recommend it to others. Therefore, the following hypothesis is proposed.

H6: Patients' satisfaction in dental institutions has a positive direct impact on patients' behavioral intention.

(5) Perceived service quality and behavioral intention

Service quality is objective, but for different patients, they still have different evaluations of the same service and product. The positive evaluation will lead to positive behavior intention. Many researchers have verified the relationship between perceived service quality and behavioral intention from many perspectives (Oliver, 1999; C. X. Wang et al., 2001; Zeithaml et al., 1996).

Different patients have different perceptions of the services received, which will affect the loss and retention of hospital customers. Based on this, the following hypotheses are put forward.

H7: the enterprise image of dental institutions has a positive direct impact on the behavior intention of patients.

H8: the medical staff of dental institutions has a positive direct impact on the behavior intention of patients.

3.2.2 Hypotheses about mediating effect

Most researchers conclude that perceive service quality affects the intention of repurchase through the mediating role of satisfaction (Cronin & Taylor, 1992; Lee & Hwan, 2005; Zeithaml, 1988). Researchers believe that consumers will compare the expectations and the perception of the product or service received. The evaluation results will affect the perceived

value and behavior intention (Cronin et al., 1997; Gao, 2016; Haemoon, 1999; C. X. Wang et al., 2001).

The researcher in this research believes that the perceived service quality affects the patients' satisfaction with the service and their intention of whether to purchase the service again, recommend it to others and repurchase it regardless of price increase. Besides, the patients' cost-benefit analysis is positively related to satisfaction. Based on this, the following three hypotheses are put forward.

H9: the image of dental medical institutions has a positive indirect impact on the behavior intention of patients with patient satisfaction and perceived value as mediating variables.

H10: the medical facilities of dental institutions have a positive indirect impact on patient satisfaction with perceived value as a mediating variable.

H11: the medical staff of dental institutions has a positive indirect impact on patients' behavior intention with patients' satisfaction and perceived value as mediating variables.

3.2.3 Moderating effect of patient participation in treatment process on perceived value and patient satisfaction

According to literature review, patient participation as moderating variable has strengthened the positive impact of the perceived value on the patient satisfaction, but there is disagreement over how much the impact is strengthened.

Based on the widely-accepted views, the research hypothesizes that patient participation enhances the positive impact of perceived service value on patient satisfaction (Ennew & Binks, 1999; Guo, 2016).

Patients can develop a strong sense of control over the treatment process by collecting disease-related information, actively expressing their views or cooperating with doctors. As a result, active patient participation in the treatment process will strengthen the positive impact of perceived value on patient satisfaction. Based on the above analysis, the following hypothesis is proposed:

H12: Patient participation as moderating variable has strengthened a positive impact of patients' perceived value on satisfaction.

3.3 Current situation of surveyed hospital in this research

The full understanding of the current situation of the hospital surveyed in this research is to develop a model and scale which suits the actual situation of the dental hospital in question. The scale is the critical tool to collect the data regarding the respondents' perceived service quality, satisfaction and behavioral intention. An in-depth and accurate understanding of the current situation of the hospital in question is helpful for the correct selection and design of scale.

3.3.1Introduction of surveyed hospital and the analysis of competing rivals

The surveyed hospital in this research is located in Jiangning District, Nanjing City, Jiangsu Province, in the southeast of the city, where there are many enterprises and universities, including automobile, information technology, environmental protection, energy saving and smart grid pillar industries as the powerhouse of the local economy. Jiangning University Town has more than 20 colleges and universities, such as Hohai University and Nanjing University of Aeronautics and Astronautics, with more than 200,000 teachers and students on campus. Covering an area of more than 1500 square kilometers, Jiangning District has 10 streets and more than 100 communities, with a permanent resident population of 1.34 million. It is one of the most populous, largest and most economically powerful areas in Nanjing. By the end of 2017, Jiangning District has more than 400 medical institutions, including 32 hospitals, but no dental specialized hospitals.

This situation has presented an opportunity and a challenge to the surveyed dental hospital. Based in Jiangning district, the dental hospital focuses on serving the people for the whole city. The market positioning determines that the medical departments, medical service level, medical team quality must meet the requirements for secondary specialized hospitals. Therefore, it should not only have a professional standardized management system and provide high quality medical service, but also possess high-tech oral and dental equipment, professional dental team and famous experts to ensure that the quality medical services are delivered and bring positive experience for patients. The medical departments are established in accordance with the requirements of the health administrative department, including the radiology department, orthodontics department, prosthodontics department, implant department, maxillofacial surgery department, periodontics department, pediatric dentistry department, dental pulp department, laboratory department and medical service department.

With the improvement of people's living standards, people pay increasing attention to health, especially oral health. In recent years, small dental clinics with ordinary or low quality doctors are emerging in large numbers, largely located near urban communities.

At present, the chain oral healthcare institutions are growing quickly and mostly located in provincial capital cities or first tier cities, just to name a few, KB+ DENTAL HOSPITAL, MYOUR DENTAL and DENTAL DOCTOR in Nanjing, with strong financial strength, favorable medical environment, complete kinds of high-end dental and oral equipment, high service quality and medical skills and famous experts. Their revenues mainly come from dental implants, orthodontics and prosthodontics services.

Most popular dental specialized hospitals with long history are located in the centers of Nanjing such as Nanjing Stomatological Hospital and Stomatological Hospital affiliated to Jiangsu Medical University. With large building areas and wide coverage of population, those specialized hospitals are mostly third-level hospitals affiliated to stomatological colleges, with famous experts, excellent equipment, high medical skills and research strength, capable of treating a variety of intractable oral diseases, including oral and maxillofacial surgery, dental implants, orthodontics, prosthodontics, among others.

There are also stomatological departments in several general hospitals in Jiangning District, which are smaller in scale and weak in strength compared with specialized hospitals. An investigation conducted by the surveyed dental hospital in this research on the technical level and hardware equipment among a random sample of 278 patients has the following findings:

(1) The older patients have higher requirements for medical technology, especially the middle-aged and elderly people over 50 years old; young people care more about the geographical location of oral institutions, preferring those near living quarter, parking lot, shopping mall and restaurants.

(2) People of all ages care about the service quality, including treatment outcome, service attitude of dental medical staff.

(3) The investigation shows that patients care little about the strength of the scientific research of public dental institutions because many respondents are worried about becoming the experimental subjects of scientific research.

3.3.2 SWOT Analysis of surveyed hospital

In the early days of establishment, the surveyed hospital conducted a comprehensive analysis of SWOT in order to evaluate its advantages, weakness, opportunities and threats to neutralize the business risks after being put into operation. The analysis results are as follows:

(1) Advantages in terms of experts, technologies and services

1) The hospital has three experts: two famous experts who formerly worked in public hospitals and one technological management talent

The first chief expert has solid experience and professional qualifications in oral implants. With a doctoral degree in stomatology, he is now a doctoral supervisor, the chairman of Jiangsu Dental Planting Committee, pace-setter of the key national and provincial dental projects, and was honored as the most trusted dental expert in Jiangsu Province. As the corresponding author or the first author, he has published more than 60 papers in SCI and more than 90 papers in several core journals such as Journal of Oral and Maxillofacial Surgery. Besides, he is in charge of more than ten scientific projects subsidised by the National Natural Science Fund, the University of Hong Kong, and the Department of Health of Jiangsu Province, the Department of Education of Jiangsu Province and the Department of Science and Technology of Jiangsu Province. He has won many provincial and municipal awards for huge contributions to dental science and technology. His research focuses on the repair of maxillofacial defect, influencing factors of maxillary regeneration, oral medicine education, maxillofacial surgery and implant surgery.

The second chief expert is a deputy chief physician and associate professor with proven expertise in orthodontics. He is the former member of the Orthodontic Professional Committee of the Chinese Medical Association, expert member of Medical Malpractice Appraisal Committee of Nanjing and Jiangsu Medical Association, member of the expertdatabase of Jiangsu Technical Achievements Management, member of Nanjing and Jiangsu Stomatological Quality Control Center, examiner of Nanjing oral health practice skills examination, and editorial board member of the Journal of Oral Science Research. After graduation, he has been working in Nanjing oral hospital, and has been awarded the honor of Excellent Communist Party Member and Model Worker of Nanjing oral hospital many times. He has more than 30 years of clinical experience in orthodontics and scientific research.

The hospital president is studying for a doctoral degree. With 20 years of working experience and technical expertise in dental implant, he is skilled in technically complex implant, minimally invasive implant, immediate implant, GBR bone grafting and maxillary sinus lifting. He once worked as the general manager of Shenzhen business department of

national chain oral institutions with proven experience in team building, hospital management, performance evaluation, cost control, marketing planning and service concept.

2) Two core technologies: zygomatic and pterygoid bone piercing implant, minimally invasive painless implant

3) Service: committed to comprehensive high quality and considerate service

With the service concept of patient-centered, the hospital has continuously forged its reputation by providing high quality and considerate medical services in all aspects for patients, which will be elaborated in Section 3.3.3 of this thesis.

(2) Disadvantages

1) Low brand recognition

Established in 2017, the surveyed hospital is a secondary stomatological hospital. In just five years, it has stayed ahead of other dental hospitals in Jiangning District of Nanjing. Although the hospital enjoys a high reputation in the industry, it still has low recognition and is not very popular with patients. Therefore, efforts should be made to establish its branches and strengthen promotion.

2) Low rate of outpatient visits in early days of its establishment

As a stomatological hospital with only five years of history, the hospital needs to constantly build its reputation by providing high-quality service with high medical skills. With many other public hospitals as strong competitors, the private hospital has witnessed a low rate of outpatient visits for a long time in the early days of its establishment. Therefore, effective measures should be taken to get it out of difficulties.

3) Low trust in private dental institutions

Patients in China generally trust public hospitals more than private hospitals because of the nature of sponsors. In response, private dental hospitals should concentrate on fostering trust among patients while ensuring the service quality and profits.

(3) Opportunities

1) Satisfy the oral health needs that other dental institutions cannot meet

Based on the aforementioned market environment in which the surveyed hospital operates and the conditions of competing rivals in the dental market, the hospital is fully capable of satisfying the growing oral health needs that other dental institutions cannot meet with its advantages.

2) Few competitors in the Jiangning District

3) There are a large number of patients who are especially coming to seek treatment by famous experts.

The three experts described in section (1) are all high-caliber talents in the dental industry, with high medical and management level and service awareness, who will lead the hospital towards a promising prospect.

(4) Threats

1) The scale of the surveyed hospital is still small and the hospital is facing low price competitions of other rivals

2) Inconvenient transportation to visit experts

3) Within a 3 kilometer radius, there are two dental clinics affiliated to public specialized hospitals as strong competitors.

Based on above analysis, it can be seen that the hospital in question accurately positions itself according to geographical location, social environment and market environment. Besides, it is necessary to further explore how to establish a harmonious patient-doctor relationship, explore the influencing factors of patient satisfaction and find ways to improve medial quality and patient satisfaction. The research results of this research can provide theoretical basis for hospital management decision-making.

3.3.3 Measures to improve patients' perceived service quality of the surveyed hospitals

In order to achieve the development goal, the hospital has worked out many targeted, constructive and operable methods to improve service quality, but it still needs to seek a theoretical basis for further improvement. The improvement suggestions proposed in Chapter 6 are based on the concrete measures as follows:

(1) The first is to constantly improve the medical technological level. For patients with osteoporosis, thin alveolar bone, and edentulous jaw, the low density and hardness of oral bones make it difficult to perform traditional dental implants. But the hospital has made a breakthrough in these technically complex implants such as pterygoid bone piercing implant, zygomatic bone piercing implant and minimally invasive implant.

Zygomatic piercing implant is to fix the two ends of implants to the zygoma bone and alveolar ridge crest because the zygoma bone is very hard with stable load-carrying capability, which is suitable for the edentulous patients with severe alveolar atrophy, and the edentulous patients whose oral conditions do not meet the requirements of traditional implant. The pterygoid piercing implant is to fix two implants between the maxillary tubercle and pterygoid plate in the posterior area to avoid large amount of bone extraction and grafting. The above two kinds of implants can be fixed with temporary denture on the same day after

implantation, which greatly shortens the treatment time and improves the life quality of patients. Generally, only 4-6 implants are needed to restore 14 missing teeth.

Other than that, the hospital has carried out digital "minimally invasive implants", with the help of Italy-made NewTom CBCT. Only a 4-5mm small incision is needed to implant the implants into the alveolar bone. The wound is small, which greatly reduces the postoperative bleeding and swelling, shortens the surgery time, reduces the probability of postoperative infection, and minimizes the postoperative discomfort of patients.

These three implant techniques can reflect the technological level of dental medical institutions and experts. At present, there are few dental institutions and doctors who can master and skillfully carry out this kind of technology in China. With 4 years of clinical experience of conducting these three implant techniques, the surveyed hospital has led the pack in this aspect in the dental industry.

(2) The second is to improve the quality of medical service. The perceived service quality is patients' overall evaluation of the medical experience from admission to discharge. Patients with minor oral diseases generally visit the hospitals near their living place. While patients seeking dental implant or the treatment of problems concerning the position of the teeth and jaws tend to carefully compare the dental hospitals before making final decision. The hospital reputation is an important factor to consider.

The reputation building is a long process that needs the joint efforts of all members of an organization. The hospital can gradually build a good reputation by providing high quality medical services and bringing positive experience to patients.

With the competition becoming increasingly fierce in all industries, the service quality has attracted more attention from enterprise managers. The hospital can provide a wide variety of industry-specific customer service training programs for employees, but the most important thing is to consciously and constantly put what is learned in the training into practice.

After many times of discussion and repeated practice, the hospital has formulated different service standards for different departments and corresponding measures to ensure their earnest implementation.

1) The hospital front desk and guidance station should fulfill the following service requirements.

The guidance team in front desk of the hospital is responsible for guiding patients to register, answering inquires and communicating with doctors, among others. Patients visiting dental hospitals are mostly middle-aged and old people. When patients are ready to enter the

hospital, service staff in front desk should help open the door greeting them with hello, and when they leave, service staff should open the door for them again saying “see you later”. The gracious greetings can bring a feeling of warmth and closeness to patients. Unlike the traditional service industries such as hotels and restaurants, it is improper to install a full-time doorman to greet and see off patients. Therefore, the service staff in front desk are required to take turns serving as temporary doorman, which can also relieve the stress of their other boring work. The greeting services are provided not only for patients but for all people entering and leaving the hospital in order to show respect for everyone.

The guidance staff should stay standing while serving patients. Most of the medical guidance work in front desk is completed using the computer system, such as registration, patient inquiry, patient guidance, appointment search, manual registration, return visit reminder. Except for some work needing to be completed by sitting, most of the work is still completed by standing. From another perspective, with one meter high guiding platform between the patient and the guiding staff, it is extremely impolite to serve the patients by sitting on the chair. Therefore, there is only one chair in the guiding station to ensure two or more staff providing standing service and one person sitting to complete the work. The guiding employees of the front desk are relatively young. Most of the time they are busy with guiding patients, serving tea and finding patient records, therefore they have no time to sit. If they are tired, they can take turns sitting.

With the improvement of hospital reputation, there will be more patients visiting the hospital. The guiding staff must have sharp eyes and keen ears to serve all the patients near the front desk simultaneously so that every patient who enters the door can feel served and respected. Meanwhile, the service staff of the guidance department should actively ask the visiting purpose of each person sitting in the hall to see whether they can offer any help for them. These people may come for first diagnosis, return visit, observation after treatment according to the doctor's requirements and job interviews. Besides, the service staff should appease the patients who have been waiting for more than 15 minutes by informing the doctors’ work progress and serving snacks and tea for them.

2) The medical departments should improve service quality from the following several aspects:

Before the patient sits on the dental chair, the doctor sticks disposable isolation membrane, open disposable sterile instrument tray, wear disposable sterile gloves, place disposable teeth cleaning cup, inform the patient that the equipment used is strictly disinfected and safe. Patients with high consumption ability have higher requirements for hygiene and disinfection.

Remember that after the treatment of the previous patient, the dental chair needs to be restored and disinfected; then guide the patient to sit on the dental chair in the right way and posture; support the patient's back till he or she slowly lies down on the back of the dental chair.

The doctors should show empathy and think in patients' position. However, when the number of patients increases, it is possible for doctors to focus on treatment rather than comfort. Moreover, patients just passively receive treatment and are given no information about the disease conditions and treatment methods. In order to avoid such situations, the hospital requires doctors and nurses to let patients fully express their ideas first and then use easily understood language to communicate with patients about the disease condition and treatment scheme. Second, the doctor should control the pace of treatment process and operate slowly; give the patient time to close their mouth for rest; tell the patient the treatment progress while operating. Third, the doctor should operate as gently as possible to make the patient feel comfortable. Meanwhile, a notice board is posted on the door of the treatment room providing the mobile phone number of the hospital president. If the patient feels dissatisfied with the doctor's service attitude, he or she can call at any time to complain directly.

The hospital has introduced the follow up service as an evaluation index. After treatment, patients may encounter a variety of unpredictable problems, and sometimes a small problem will cause panic. Therefore, it is necessary to provide timely follow-up service to answer patients' questions. Even if patients have no questions after treatment, a follow up call from a professional medical team can give patients a feeling of warmth and closeness that contributes to harmonious doctor-patient relationship. By adding patients on WeChat that are widely used in China, the medical team can timely send postoperative precautions, answer patients' inquiries online, which can help improve the hospital's reputation and bring more new patients.

3) All the employees in the hospitals are required to show others courtesy and politeness. When you meet anyone about three meters away from you in the hospital, you should greet them with smiles; when you meet anyone about one meter away from you in the hospital, you should stop, lean your body on one side and let that person go first and say hello to her/him softly.

Most Chinese people are shy. Therefore, the hospital president and management staff first play an exemplary role and ultimately all employees form the habit of showing politeness and kindness to patients and any others in the hospital.

Overall, the hospital has done everything it could to improve patients' perceived service quality. But these bold attempts are all based on experience rather than any theory. Therefore it is possible to cause a lot of waste of human and material resources or have adverse effects on patients giving them the impression that the hospital service is changeable. Therefore, it is necessary to establish research model and conduct in-depth research, so as to provide theoretical basis for dental institutions to improve patients' perceived service quality.

Chapter 4: Research Methods and Questionnaire Design

4.1 Research methods

Based on the previous literature review and research hypotheses, the following research methods are adopted in this research:

4.1.1 Literature review

An extensive literature review of the past research surrounding the research object of this research is conducted and relevant theories and research findings are summarized and presented. The literature on patient participation, behavior intention, patient satisfaction and perceived service quality are carefully reviewed and relevant research methods, research results and limitations are summarized.

4.1.2 Expert consultation method

On the basis of theoretical analysis, 2-3 experts in the dental field are interviewed to discuss and analyze the influencing factors of patients' satisfaction and behavior intention. From the perspective of patients' perceived service quality, the theoretical model regarding the effect of patient satisfaction on patients' behavior intention is constructed.

4.1.3 Questionnaire survey

In order to improve the service quality and customer loyalty of the dental hospital, a questionnaire survey is conducted among the patients in a private dental hospital in China based on a five-point Likert scale. The question items are extracted and revised from existing mature scales.

4.1.4 Statistical analysis

Software SPSS24 is used to analyze the research data collected based on structural equation analysis method and descriptive statistical analysis method in order to test the practicability of research model. The analysis is conducted on a pre-survey on the scale as well as the testing of reliability and validity to confirm the internal reliability and discriminant validity of the

questionnaire. The principal component analysis method is used for the analysis of the exploratory factors, the determination of the main dimensions for scale analysis, and the renewal of scale according to the pre-survey results with the dimensions guaranteed. Meanwhile, descriptive statistical analysis is used to explore the relationship between the characteristics of samples and variables of the model. K-means cluster analysis is applied to conduct class-based discussions on the samples.

4.1.5 Structural equation model analysis

The SEM analysis is used to examine how the latent variables are interrelated with each other. The hypothesized relationships between patients' behavioral intention, satisfaction and perceived service quality are analyzed and tested. The analysis software is AMOS22.0.

4.2 Scale design rules

In order that the questionnaire survey reflects the actual conditions of research object, the questionnaire items must be carefully designed and selected, for example, irrelevant, less relevant and similar items will not be included in the questionnaire. In order to accurately reflect the patients' perceived service quality, satisfaction and behavior intention of the surveyed hospital, the scale items are selected according to the following principles:

4.2.1 Design comprehensiveness

The index system can comprehensively reflect the actual situation of patients' perceived service quality, perceived value, satisfaction and behavior intention, and meanwhile is consistent with the research model constructed in Chapter 3. The index system should include a process index and result index.

4.2.2 Design goals

The items of different indicators should meet the requirements of research purpose aimed at accurately acquiring the actual feelings and opinions of patients about the medical service they receive in surveyed hospital, so as to explore the relationship between different measurement indicators and provide theoretical basis for the hospital in question to improve patients' perceived service quality, perceived value and satisfaction.

4.2.3 Minimum number of items

The number of items should be as small as possible. Redundant items of indicators will cause difficulty in data analysis and the possible overlapping of meaning of items under different indicators. Although the items can be simplified in the process of data analysis, it is advised to carefully select the items and reduce the item number as small as possible.

4.2.4 Operability of results

The purpose of the survey is to explore the relationship between patients' perceived service quality, perceived value, satisfaction and behavior intention and based on which constructive suggestions are provided to improve the hospital's policies and business strategies. Therefore, the items should be relevant to the measures possibly taken to improve the service quality of the hospital.

4.3 Questionnaire design

4.3.1 Scale design

There are five variables in this research, including patient participation, behavior intention, patient satisfaction, perceived value, and service perceived quality. Perceived quality is divided into three sub variables: enterprise image, service facilities and service personnel.

In order to ensure the validity and reliability of the questionnaire scale in this research, combined with the characteristics of dental healthcare service, the existing widely-used scales surrounding the influencing factors of customer service quality are referenced and revised into the scale adopted in this research. Meanwhile, the opinions of experts are seriously considered in question items design. The scale is shown in Table 4.1 below.

Table 4.1 Items of questionnaire scale and sources

Variable		Number	Item	Source
Perceived quality of enterprise image (EI)	Enterprise publicity	EI1	Appropriate hospital publicity and reputation	Cronin and Taylor (1992); Tian and Zhang (2013); Guo (2016); Parasuraman et al. (1985); Li (2007)
	Response mechanism	EI2	No responsibility evasion from both parties in doctor-patient disputes	
		EI3	The hospital values and responds quickly to my comments or complaints	
		EI4	Reasonable waiting time	
	Price mechanism	EI5	Reasonable treatment cost	

Variable		Number	Item	Source
			and clear and easy price list	
	Service mechanism	EI6	The hospital provides me with health guidance, return visits, psychological care.	
		EI7	The hospital can provide me with special help services besides treatment	
	Information sharing	PP1	Share with medical staff your treatment information	
	Responsibility behavior	PP2	Actively cooperate with the treatment	
Patient participation (PP)	Interpersonal interaction	PP3	Proactively communicate with doctors about your condition, needs and questions	Ennew and Binks (1999); Geng (2008)
	Information searching	PP4	Proactively understand relevant knowledge about this treatment before seeing the doctor	
	Medical facility	SF1	Treatment facilities are in good conditions, with no faults in operation	
	Auxiliary facility	SF2	Enough basic facilities including washrooms, rest areas, indicators, with good functions, appropriate publication and clear indication	Cronin and Taylor (1992); Tian and Zhang (2013); Guo (2016); Parasuraman et al. (1985); Li (2007)
Perceived quality of service facility (SF)		SF3	Auxiliary facilities (including Wi-Fi, printers) are enough in number and highly modernized	
	External environment	SF4	Convenient traffic to the hospital and good external environment	
	Hospital environment	SF5	Quiet hospital environment, good sanitary conditions, fresh air	
	Treatment effect	SP1	The attending doctor can correctly describe my conditions	
Perceived quality of service personnel (SP)		SP2	The attending doctor can provide the treatment results precisely and timely	
	Service attitude	SP3	Guiding staff of the hospital can precisely tell me the conditions of	

Variable		Number	Item	Source
			hospital and relevant information in detail	
		SP4	Doctors can ask me about my conditions, answer my questions and provide treatment	
		SP5	Technical staff can deal with emergency quickly	
		SP6	Staff can understand my needs and provide help quickly	
		SP7	Medical staff are decent in appearance and behaviors	
	Privacy protection	SP8	Medical staff can respect and protect my privacy	
Perceived value (PV)	Functional value	PV1	Basic medical technology equipment and professional care level can meet my needs	Sweeney and Soutar (2001); Hu et al. (2017)
	Emotional value	PV2	This treatment is pleasant	
	Social value	PV3	The service means and quality of the hospital is worth promoting	
	Efficiency value	PV4	This treatment is worth the money I paid	
	General satisfaction	PS1	Satisfied with the general services of the treatment	Cronin and Taylor (1992); Qian et al. (2015)
Patient satisfaction (PS)	Compared with expectation	PS2	The actual feelings and expectations of this treatment were roughly the same	
	Compared with ideal situation	PS3	This treatment can meet my demands in general	
	Repurchase intention	BI1	If I have any problems again, I will come to the hospital for treatment.	
Behavioral intentions (BI)	Recommendation intention	BI2	Will promote the hospital or treatment through WeChat or Weibo.	Fishbein and Ajzen (1977); Backman and Crompton (1991)
		BI3	If I have a chance, I will recommend friends to the hospital for treatment	
	Higher price purchase intention	BI4	Willing to pay higher prices for treatment at private hospitals	

4.3.2 Questionnaire design

The questionnaire in this research falls into three parts. The first part mainly describes the research subject, research purpose and confidentiality principles of the questionnaire, informs

the respondents of the intention of the survey and ensures that they can answer according to their real experience and feelings. The second part includes 35 question items listed in Table 4.1, which are all declarative statements. The respondents are required to complete the questionnaire according to their actual feelings and experience. The questionnaire is based on Likert five-point scale from 1 to 5, with 1 representing “extremely disagree” and 5 representing “extremely agree”. The third partfocuses on the personal information of the research subjects, such as gender, age, education background, occupation, the number of visits to dental hospital every year, the department the patient generally visits. The question items are designed according to the following principles.

1. First level indicators

A series of hypotheses proposed in Chapter 3 are based on the ECSI model. Initially the customer expectation as a research variable is included into the research model, but customer expectation refers to the expectation of patients before receiving dental treatment, which can not reflect the actual feelings of the patients after treatment. Therefore, the variable customer expectation in the ECSI model is ultimately eliminated from the research model in this research. Besides, the patient participation as the moderating variable between perceived value and patient satisfaction is introduced into the model. The perceived service quality is divided into three dimensions: enterprise image, service facilities and service personnel.

Thanks to the scientific and technological strength of the surveyed hospital, the hospital can provide diversified dental services for patients. According to the income and education background of patients, the first-level indicators such as enterprise image, service facilities and service personnel are further subdivided. Specifically, the enterprise image is divided into four dimensions, including enterprise promotion, response mechanism, price mechanism and service mechanism. The enterprise image can be gradually improved through active promotion campaign and improvement measurements aimed at improving the perceived value and satisfaction of patients. Service facilities are divided into four dimensions such as medical equipment, auxiliary facilities, external environment and medical environment. The items regarding the hardware facilities such as medical equipment, auxiliary facilities and medical environment are used to evaluate the extent to which the hardware facilities affect the patients' perceived value and satisfaction. The external environment refers to whether the transportation is convenient.

The variable service personnel is divided into three dimensions, namely, treatment effect, service attitude and privacy protection. The treatment effect refers to patients’ perception of the service quality after receiving treatment. The service attitude refers to the overall attitude

of medical staff in providing services. What the patients care most about is the privacy protection, which reflects the degree of medical staff's respect for patients' privacy.

Based on the research of Sweeney and Soutar (2001) and Hu et al. (2017), the variable perceived value is divided into four dimensions: functional value, emotional value, social value and efficiency value. They reflect to what extent the treatment has met the expectations of patients. The patient satisfaction is the subjective evaluation of the service quality, which is determined by perceived value. The functional value measures whether the services provided by the hospital have met the basic needs of patients; emotional value refers to whether the doctors pay attention to the emotional needs during treatment; social value refers to whether the service mode of this hospital is worthy to be applied in other cities and has social implications; efficiency value refers to the evaluation of whether what is gained is more than what is lost.

The first level indicators of patient satisfaction are designed based on the scale developed by Cronin and Taylor (1992) and Qian et al. (2015), which include overall satisfaction, satisfaction compared with expectation and satisfaction with ideal expectation. We can see the satisfaction refers to patients' actual feelings compared to their expected service.

The behavior intention is about whether patients will visit the hospital again or recommend it to others or even repurchase the services at an even higher price. Therefore, the variable behavior intention is divided into repurchase intention, recommendation intention and premium repurchase intention.

Because the patients' expectation has been fully considered in the variables of perceived value and satisfaction, it has not been included into the research model in this research. Instead, patient participation as the moderating variable between perceived value and satisfaction is introduced, to explore the effect of patient participation on perceived value and satisfaction. The first level indicators of patient participation include information sharing, responsibility behavior, interpersonal interaction and information searching. Information sharing means the patients actively help doctors fully understand their diseases conditions; responsibility behavior refers to that patients actively participate in the treatment process, instead of interfering with the treatment and deliberately creating obstacles for the implementation of treatment scheme; interpersonal interaction means that the patients actively communicate with doctors, ask treatment methods and give their ideas and keep a close watch on the treatment effect; search information refers to the patients' active search for disease-related information to increase their knowledge about the disease in order to better cooperate with the doctor for treatment.

2. Second-level indicators

In order to reduce numbers of items and make the question items more relevant, one indicator generally includes one item. However, according to past experience, the item adjustment during data processing possibly results in the item deletion and missing of indicators. To avoid that, the research increases the second level indicators and corresponding items under the first level indicators.

The first level indicator “response mechanism” is divided into three second level indicators, including whether the hospital will evade responsibility in case of medical dispute, whether the hospital pays particular attention to the patients’ questions and how quickly the hospital respond to the patients’ medical needs. The first level indicator “service mechanism” is divided into two second level indicators, which are concerned with whether the hospital has physically and mentally supported the patients.

In terms of variable service facilities, there are two second level indicators under auxiliary facility, which are about the conditions of basic facilities and auxiliary facilities respectively. In terms of the variable service personnel, the first level indicator “treatment effect” has two second level indicators, namely the ability of doctors to diagnose and treat disease. The first level indicator “service attitude” has five second level indicators, that is, the service attitude of guidance staff, doctors, technical personnel, other staff and medical staff’s overall appearance and politeness

The variable behavioral intention is divided into two dimensions, which are about the recommendation behaviors online and offline.

Based on the above design, the preliminary survey questionnaire is developed, which includes 25 first-level indicators and 32 second level indicators (or items). It is hoped that the questionnaire survey can collect data accurately reflecting the respondents’ perceived service quality, perceived value, satisfaction and behavioral intention, so as to provide data support for subsequent statistical analysis.

Chapter 5: Empirical Analysis

Formal questionnaires were distributed to patients receiving treatment in the surveyed hospital with their consent. Pre-survey and formal survey were conducted in the investigation process of this research. Questionnaires with questions left unanswered are deemed invalid. A total of 115 questionnaires were issued in the pre-survey section, with 112 collected, or a collection rate of 97.4%. 255 questionnaires were issued to the patients in the formal survey process, with 245 retrieved, or a collection rate of 96.1%. Before the empirical data analysis, it is necessary to verify whether the data follow the normal distribution. Therefore, the kurtosis and skewness of the data are calculated. The analysis results show that the absolute value of skewness of all data is less than 1, which is smaller than the standard (3.0). The absolute value of kurtosis of all data is around 1, which is far smaller than the standard (8.0). Therefore, the research data all obey the normal distribution.

5.1 Descriptive statistical analysis

The results of descriptive statistical analysis of the personal information of the respondents are shown in Table 5.1. In this survey, female patients accounted for 50.6%, and male patients accounted for 49.4%. In terms of age, the proportion of respondents aged 26 to 35 is the largest, accounting for 31.4%. With the increasing or decreasing of age, the proportion of respondents (below 26 or above 35) gradually decreases. Overall, the proportion of patients aged 26-60 years old accounts for 64%. It shows that dental problems are mostly found in the young and middle-aged stage.

5.1.1 Descriptive statistical analysis

In regard to education background, most people graduate from junior colleges or universities, accounting for more than half, reaching 50.2%, which is in line with the reality. In terms of occupation, the distribution of people under 60 (non-retirees) is relatively even, basically around the average (20%). The number of professional staff is basically the same as that of retirees (about 10%). The number of visits to the dental hospital is related to patients' age, with relatively even distribution — 20-30% respondents choose each option. In terms of

reasons for going to the dental hospital, comprehensive treatment accounts for more than half, reaching 50.2%; children's dental treatment took up the least part, only 4.1%. This is mainly because kindergartens and other institutions are responsible for the unified supervision of children's dental diseases in China, and children are sent to relevant public hospitals for diagnosis and treatment.

Table 5.1Descriptive statistical analysis of the sample

Characteristics of samples	Eigen value	Sample size	Proportion (%)
Gender	Male	121	49.4
	Female	124	50.6
Age	Below 18	20	8.2
	18 to 25	54	22
	26 to 35	77	31.4
	36 to 45	40	16.3
	46 to 60	40	16.3
	over 60	14	5.8
Educational background	Never attended senior high school	43	17.6
	Graduated from high school or secondary technical school	74	30.2
	Junior college or university graduate	124	50.6
	Obtained a master's degree or higher	4	1.6
Occupation	Staff member of a company or public institution	46	18.8
	Self-employed	47	19.2
	Freelancer	49	20
	Student	51	20.8
	Retiree	26	10.6
	Other	26	10.6
Number of visits to dental hospitals	Once	78	31.8
	Twice	51	20.8
	Three	65	26.5
	Four or above	51	20.8
Main reasons for visiting dental hospitals	Orthodontics	31	12.7
	Oral implant	49	20
	Aesthetic repair	32	13
	Pediatric dental treatment	10	4.1
	Comprehensive treatment	123	50.2

Based on the summary results of the entire sample, the author summarizes the descriptive statistical results: the enterprise image (EI) is 4.20±0.62, the patient participation (PP) is 4.37±0.60, the service facility (SF) is 4.24 ±0.66, service personnel (SP) is 4.28±0.59, perceived value (PV) is 4.27±0.65, patient satisfaction (PS) is 4.28±0.62, and patient behavioral intention (BI) is 4.13±0.69.

5.1.2 Classification by the background information of the respondents

There are four categories for differential analysis, listed as below:

1. Differential analysis of gender

According to the results of single-factor ANOVA analysis of gender, in the results of the statistical significance test, the P values are greater than 0.05 (p>0.05). Therefore, the results of each indicator are not affected by gender differences.

2. Differential analysis of age

According to the single-factor ANOVA analysis results of age, in the significance test results, the P values of EI, PP, SF, SP and PS are all greater than 0.05 (p>0.05). Therefore, the results are not affected by differences in age. The p-values of the significance test results of PV and BI are both less than 0.05 (p<0.05), and there are significant differences between the groups. The researcher further explores the average values of PV and BI grouped by age: people under 25 and over 60 have slightly higher perceived value of PV and BI than people in other age groups. In addition, people between the ages of 46 and 60 have the lowest perceived value of PV and BI, especially the average BI, which is below 4.0 (p<4.0).

3. Differential analysis of educational background

According to the results of the single-factor ANOVA analysis of the educational background, the p-values of the significance test are all greater than 0.05 (p>0.05). Therefore, the results of each indicator are not influenced by differences in educational background.

4. Differential analysis of occupation

According to the results of single factor ANOVA analysis of occupation, the p-values are all greater than 0.05 (p>0.05) in the results of the significance test. Therefore, the results of each indicator are not affected by differences in professional background.

5.1.3 K-means clustering analysis

The research data collected by questionnaire survey cannot directly reflect the relationship between social phenomena and statistical data, so it is necessary to extract the element characteristics, scale, level and structure of the data through statistical analysis so as to measure the survey data. Cluster analysis method is the process of categorizing data with similar characteristics into a cluster group and there are great differences between these cluster groups (He & Lai, 2018). The cluster analysis helps researchers to understand the data belonging to different cluster groups. The commonly used clustering analysis methods include fuzzy clustering, dynamic clustering, system clustering and K-means clustering (Shen & Chen,

2004; W. Q. Wang et al., 2020; Zhang, 2020). K-means clustering algorithm is a classic clustering analysis method in data parsing with no need of prior knowledge. It categorizes the data into different cluster groups according to their characteristics. K-means clustering algorithm is actually a process of repeatedly iterating the cluster centers till the iteration results are consistent with the pre-set convergence conditions and number of iterations (Han, 2013). This algorithm is simple and easy to understand with high efficiency and therefore has been widely applied in different fields.

In this research, the clustering analysis method based on K-means clustering algorithm can reduce the errors caused by researchers' cognitive bias in data categorization. During data analysis, the sample data are randomly divided into k groups first, and then this algorithm selects k samples as the initial clustering center and groups the data close to the clustering center into the same group, and further repeatedly iterates the data to output the final clustering results.

K-means clustering algorithm, also known as the step-by-step clustering method, is a dynamic iterative clustering algorithm. It first categorizes N sample data into K groups and randomly selects select sample data in each group as the clustering center $\mu_i(1 \leq i \leq k)$. After iterative computation, the Euclidean distance between the clustering centers and the target data can be calculated to determine the clustering centers close to target data. The sample data just categorized into different clustering groups will be used as new clustering centers to be involved in the next round of iteration. The iterative operation is repeated until the sum of square error of each cluster group no longer changes or the maximum number of iterations occurs (W. J. Li, 2014; J. C. Yang & Zhao, 2019). The advantage of the algorithm is that it is highly flexible and efficient in processing large amount of sample data.

A data set containing N data can be expressed as X=$\{x_1, x_2, \ldots, x_i, \ldots, x_n\}$. K-means clustering algorithm can categorize the data set into cluster groups with K sample data, C={ck, i=1, 2, …k}. Each cluster group has a cluster center. The Euclidean distance is used to measure the distance between target data and clustering center.

$$\mathbf{D}(\mathbf{x}, \boldsymbol{\mu}_\mathbf{i}) = \sqrt{\sum_{\mathbf{x_i} \in \mathbf{c_k}} (\mathbf{x_i} - \boldsymbol{\mu}_\mathbf{i})^\mathbf{2}} \tag{5.1}$$

Where, x_i denotes target data, μ_i is the cluster center of *ith* cluster group, the purpose of K-means clustering algorithm is to obtain the minimal total sum of error squares and SE of each cluster. The calculation formula of square errors and SE of the dataset is (J. C. Yang & Zhao, 2019)

$$\mathbf{SE} = \sum_{\mathbf{i=1}}^{\mathbf{k}} \sum_{\mathbf{x_i} \in \mathbf{c_k}} |\mathbf{D}(\mathbf{x}, \boldsymbol{\mu}_\mathbf{i})|^{\mathbf{2}} \quad (5.2)$$

Where, the value of SE indicates the quality of clustering results, and K denotes the total number of clusters. The square errors and SE of clusters will decrease as the number of clusters (represented by k) increases (When k=n, D(x, μ_i)=0) (Q. Wang et al., 2012).

K-means clustering algorithm is a continuous iterative process (Jain, 2010). First the sample data is categorized into K cluster groups then the target data are repeatedly iterated to reduce the value of square error and SE of clusters. The following are the results of descriptive statistical analysis based on k-means clustering analysis.

1. K-means cluster results

K-mean cluster analysis is performed with K=2, 3, 4, and 5, and the reference variables including EI, PP, SF, and SP. The results show that when K=3, the index of cluster center points among different groups has the highest degree of discrimination. According to the results of single-factor ANOVA analysis, the p-values of the significance test results among the index groups are all lower than 0.05 (p<0.05), so there are significant differences among the groups. The clustering results are as follows:

1) The first group has 88 people, whose cluster center points are EI-4.73, PP-4.97, SF-4.83, SP-4.93, and this group has the highest perceived scores in terms of enterprise image (EI), patient participation (PP), service facilities (SF) and service personnel (SP), all above 4.7. A descriptive analysis of the group shows that their perceived value (PV) is 4.84, patient satisfaction (PS) is 4.77, and patient behavioral intention (BI) is 4.66.

2) The second group has 116 people, whose cluster center points are EI-4.09, PP-4.10, SF-4.12, SP-4.01. The perceived scores of enterprise image (EI), patient participation (PP), service facilities (SF) and service personnel (SP) are all above 4.0. A descriptive analysis of the group of people indicates that their perceived value (PV) is 4.09, patient satisfaction (PS) is 4.15, and patient behavioral intention (BI) is 3.92.

3) The third group owns 41 people, whose cluster center points are EI-3.41, PP-3.83, SF-3.32, SP-3.63. The perceived scores of enterprise image (EI), patient participation (PP), service facilities (SF) and service personnel (SP) are between 3.0-4.0. A descriptive analysis of the group of people reveals that their perceived value (PV) stands at 3.56, with patient satisfaction (PS) 3.59, and patient behavioral intention (BI) 3.56.

2. Descriptive statistical analysis of enterprise image (EI)

EI1 = 4.14±0.67, EI2 = 4.14±0.66, EI3 = 4.21±0.65, EI4 = 4.18±0.67, EI5 = 4.19±0.70, EI6 = 4.31 ±0.67, EI7 = 4.30±0.67. According to the results of K-mean cluster analysis, a

single sub-indicator of EI has the same overall trend as the EI in the classification. The first group has the highest perceived value of each sub-indicator, followed by the second group and the third group. The scores of all sub-indicators are below 4 points.

3. Descriptive statistical analysis of patient participation (PP)

Descriptive statistical results of patient participation (PP) show that the score range of PP1 is 4.28 0.65, that of PP2 is 4.31 0.64, that of PP3 is 4.34 0.64 and that of PP4 is 4.34 0.63. According to the results of K- means clustering analysis, the sub-indicators of a single PP are the same as the overall trend of PP in the classification, and the sub-indicators of the first category have the highest perceived value, followed by the second category. Finally, it is the third category, and the scores of each sub-index are below 4 points.

4. Descriptive statistical analysis of service facilities (SF)

The score range of SF1 is 4.23±0.678, with SF2 4.27±0.67, SF3 4.24±0.65, SF4 4.20±0.70, and SF5 4.20±0.71. According to the results of K-means cluster analysis, grouping comparison indicates that the trend of a single sub-indicator of SF is the same as that of SF in the classification generally. The perceived score of each sub-indicator in the first group is the highest, followed by the second group and the third group. Each sub-indicator score is below 4 points.

5. Descriptive statistical analysis of service personnel (SP)

The score range of SP1 is 4.27±0.61, with SP2 4.30±0.61, SP3 4.32±0.60, SP4 4.23±0.64, SP5 4.24±0.63, SP6 4.26±0.64, SP7 4.24±0.65, and SP8 4.29±0.62. Based on the results of K-means cluster analysis, the grouping comparison shows that a single sub-indicator of SP has the same trend as those in the classification overall. The perceived score of each sub-indicator in the first group is the highest, followed by the second group and the third group. Each sub-index score is below 4 points.

6. Descriptive statistical analysis of perceived value (PV)

PV1 is 4.24±0.66, PV2 is 4.23±0.68, PV3 is 4.20±0.67, and PV4 is 4.20±0.66. According to the results of K-means cluster analysis, grouping comparison indicates that the trend of a single sub-indicators of PV is the same as that of SF in the classification generally. The perceived scores of each sub-indicator in the first group is the highest, followed by the second group and the third group. Each sub-indicator score is below 4 points.

7. Descriptive statistical analysis of patient satisfaction (PS)

PS1 is 4.24±0.64, 4.27±0.60 for PS2 and 4.27±0.63 for PS3. According to the results of K-means cluster analysis, grouping comparison indicates that the overall trend of a single sub-indicators of PS is the same as that of SF in the classification. The perceived score of

each sub-indicator in the first group is the highest, followed by the second group and the third group. Each sub-indicator score is below 4 points.

8. Descriptive statistical analysis of patient behavioral intention (BI)

According to the descriptive statistical analysis of patient behavioral intention (BI), BI1 is 4.13±0.70, 4.04±0.73 for BI2, 4.11±0.71 for BI3, and 4.01±0.72 for BI4. According to the results of K-means cluster analysis, grouping comparison indicates that the overall trend of a single sub-indicator of BI is the same as that of BI in the classification. The perceived score of each sub-indicator in the first group is the highest, followed by the second group and the third group. Each sub-indicator score is below 4 points.

5.2 Reliability and validity analysis of the questionnaire

5.2.1 Pilot survey and questionnaire modification

1. Reliability analysis of pilot questionnaire survey

The coefficient Cronbach's α and the corrected item total correction (CITC) coefficient are used to test the reliability of pilot questionnaire. If the CITC of an item is smaller than 0.5 (CITC<0.5), the item will be eliminated. When the Cronbach's α of all variables is greater than 0.7, the questionnaire is considered acceptable (H. Zhang & Tian, 2007). The analysis using SPSS24.0 found that the CITC and Cronbach's α of all items are greater than 0.5 (CITC>0.5), and the Cronbach's α of all variables is greater than 0.7, as shown in Table 5.2. In addition, the Cronbach's α will not increase after deleting any item, which indicates that the questionnaire has high reliability.

Table 5.2 Reliability analysis of pilot questionnaire

Variable		No.	CICT	Cronbach's α if Item Deleted	Cronbach's α
Enterprise Image (EI)	Enterprise promotion	EI1	0.724	0.903	.915
	Response mechanism	EI2	0.638	0.912	
		EI3	0.786	0.897	
		EI4	0.769	0.899	
	Price mechanism	EI5	0.804	0.895	
	Service mechansim	EI6	0.750	0.900	
		EI7	0.707	0.905	
Patient participation (PP)	Information sharing	PP1	0.808	0.853	.897
	Responsibility behavior	PP2	0.785	0.862	
	Interpersonal interactions	PP3	0.777	0.865	
	Information	PP4	0.715	0.887	

	searching				
Service facilities (SF)	Medical equipment	SF1	0.773	0.923	.930
	Auxiliary facility	SF2	0.850	0.908	
		SF3	0.794	0.918	
	External environment	SF4	0.814	0.915	
	Medical environment	SF5	0.850	0.908	
Service personnel (SP)	Treatment effect	SP1	0.726	0.936	.940
		SP2	0.787	0.932	
	Service attitude	SP3	0.774	0.933	
		SP4	0.796	0.931	
		SP5	0.779	0.932	
		SP6	0.792	0.931	
		SP7	0.826	0.929	
	Privacy protection	SP8	0.805	0.930	
Perceived value (PV)	Functional value	PV1	0.838	0.910	.931
	Emotional value	PV2	0.825	0.915	
	Social value	PV3	0.828	0.914	
	Efficiency value	PV4	0.863	0.902	
Patient satisfaction (PS)	General satisfaction	PS1	0.770	0.906	.907
	Compared with expectation	PS2	0.816	0.867	
	Compared with ideal situation	PS3	0.862	0.826	
Behavior intentions (BI)	Repurchase intention	BI1	0.706	0.853	.876
	Recommendation intention	BI2	0.798	0.815	
		BI3	0.818	0.808	
	Premium purchase intention	BI4	0.625	0.874	

2. Exploratory factor analysis

Exploratory factor analysis is mostly used when the dimensions of scale are uncertain. The purpose is to classify the influencing factors with similar characteristics in order to reduce the number of influencing factors. The perceived service quality scale used in this research is constructed based on the mature scales and the suggestions of mentors and experts in order to suit the research objects of this research. However, there is still a lack of empirical test. Thus it is necessary to conduct exploratory factor analysis to verify its rationality and feasibility. The scales for other variables are all based on mature scales, and therefore there is no need to conduct exploratory factor analysis. W. Zhang and Dong (2013) believes that at least 100 or more samples are needed for factor analysis. The samples of this research are more than 100. Before factor analysis, the KMO and Bartlett's sphericity test should be performed. If KMO is greater than 0.7 (KMO>0.7), factor analysis is preferred; if KMO is less than 0.5 (KMO<0.5), factor analysis is not preferred. In the Bartlett's sphericity test,

when the P value is less than 0.05 (KMO<0.05), it is suitable for factor analysis. There are 20 items related to patients' perceived service quality in the scale of the research. The results of factor analysis based on varimax and principal component analysis are shown in Table 5.3. According to analysis results, KMO= 0.909, and p<0.05, therefore the factor analysis is preferred.

Table 5.3 KMO value and Bartlett's test of patients' perceived service quality scale

KMO		.909
Bartlett's Test of Sphericity	Approximate chi-square	2037.168
	Degree of freedom	190
	Statistical Significance	.000

According to Table 5.4, after factor rotation of 20 items, three common factors with eigenvalues greater than 1 are extracted, which indicates there are three principle factors in the scale of the research. The items corresponding to each factor meet the expected design requirements and therefore the patient perceived service quality scale is acceptable. In addition, the cumulative explained variance of the three extracted factors is 72.342%, and the factor loading coefficients of all items are greater than 0.5, showing that the patient service quality scale has high construct validity. Combined with the results of reliability analysis, the author thinks that the validity and reliability of the questionnaire are good, which is consistent with the research requirements. Then the final questionnaire is determined (See the appendix)

Table 5.4 The factor loading matrix of patient perceived service quality (Rotated)

No	Item	Factor 1	Factor 2	Factor 3	Variance Explained (%)	Cumulative Variance Explained (%)
1	EI1	0.664				
2	EI2	0.724				
3	EI3	0.801				
4	EI4	0.804			56.955	
5	EI5	0.775				
6	EI6	0.734				
7	EI7	0.698				
8	SF1			0.665		
9	SF2			0.742		
10	SF3			0.738	6.118	72.342
11	SF4			0.859		
12	SF5			0.814		
13	SP1		0.813			
14	SP2		0.840			
15	SP3		0.822			
16	SP4		0.636		9.270	
17	SP5		0.673			
18	SP6		0.577			
19	SP7		0.708			
20	SP8		0.586			

5.2.2 Questionnaire survey

Paper questionnaires, that have high reliability, are sent out to the patients of different ages in the surveyed hospital. In order to protect the patients' privacy, the questionnaires are allowed to complete anonymously. For most old patients with poor eyesight, their questionnaires are filled out by hospital customer service staff by face to face interviewing them.

The surveyed hospital now receives more than 100 patients every day. The patients having received treatment are required to revisit the hospital for doctor's review every 7 days for four times. In different time slots, the patients are different. In order to avoid sending questionnaire to the same person, the questionnaires are sent out from April 1, 2020 to July 31, 2020 in a span of four months. The questionnaires were issued to patients at different time points in the morning and afternoon. For example, in the first week, the questionnaires were randomly issued to patients waiting for treatment or having received treatment at 9 a.m. and 2 p.m. on Monday and Tuesday so that different kinds of patients are selected to participate in the questionnaire survey.

Except for the elderly with poor eyesight, all respondents are left alone to independently complete the questionnaire according to their actual feelings. The questionnaires are retrieved at the same day and those with questions left unanswered are considered invalid.

5.2.3 Reliability and validity analysis of the formal questionnaire

When constructing the model, the validity and reliability of the research variables need to be tested first to ensure the structural equation model analysis is representative and valid. Therefore, this research first discusses the validity and reliability of research variables. The enterprise image (EI), patient participation (PP), service facilities (SF), service personnel (SP), perceived value (PV), patient satisfaction (PS) and behavior intention (BI) in this research are multi-dimensional variables with multiple second level indicators.

The analysis results of reliability and convergent validity of the scale used in this research are shown in Table 5.5. The results show that the Cronbach's α of all variables is greater than 0.9, which indicates that the scale has a high reliability, the CR value of composite reliability is greater than 0.7, and the average variance extracted (AVE) is greater than 0.5, the convergent validity of all variables is good.

Table 5.5 reliability and convergent validity of the scale

	Influencing factors		Factor loading	Cronbach's α	Composite reliability (CR)	Average Variance Extracted (AVE)
Enterprise image (EI)	Enterprise publicity	EI1	0.863	0.942	0.8749	0.7423
	Response mechanism	EI2	0.828			
		EI3	0.903			
		EI4	0.881			
	Price mechanism	EI5	0.882			
	Service mechanism	EI6	0.845			
		EI7	0.826			
Patient participation (PP)	Information sharing	PP1	0.941	0.950	0.8692	0.8000
	Responsibility behavior	PP2	0.937			
	Interpersonal interaction	PP3	0.935			
	Information searching	PP4	0.916			
Service facility (SF)	Medical facility	SF1	0.903	0.956	0.8333	0.8506
	Auxiliary facility	SF2	0.938			
		SF3	0.920			
	External environment	SF4	0.919			
	Hospital environment	SF5	0.931			
Service personnel (SP)	Treatment effect	SP1	0.848	0.964	0.8749	0.6926
		SP2	0.876			
	Service attitude	SP3	0.873			
		SP4	0.906			
		SP5	0.901			
		SP6	0.906			
		SP7	0.916			
	Privacy protection	SP8	0.915			
Perceived value (PV)	Functional value	PV1	0.949	0.962	0.8000	0.8987
	Emotional value	PV2	0.943			
	Social value	PV3	0.945			
	Efficiency value	PV4	0.955			
Patient satisfaction (PS)	General satisfaction	PS1	0.931	0.940	0.7500	0.8932
	Compared with expectation	PS2	0.942			
	Compared with ideal situation	PS3	0.962			
Behavioral intention (BI)	repurchase intention	BI1	0.920	0.940	0.7999	0.8484
	Recommendation intention	BI2	0.941			
		BI3	0.942			
	premium purchase intention	BI4	0.880			

Discriminant validity: after comparing the square root value of the latent variable AVE with the correlation coefficient between the latent variable and other latent variables (see

Table 5.6), the results show that the square root value of AVE in each dimension is greater than that of the first level indicator in the same row. Therefore, the discriminant validity of different latent variables is acceptable.

Table 5.6 Discriminant validity analysis of patient satisfaction questionnaire

Latent variables (measurement indicators)	Enterprise image (EI)	Patient participation (PP)	Service facility (SF)	Service personnel (SP)	Perceived value (PV)	patient satisfaction (PS)	patient behavioral intention (BI)
Enterprise image (EI)	**0.862**						
Patient participation (PP)	0.550**	**0.894**					
Service facility (SF)	0.605**	0.496**	**0.922**				
Service personnel (SP)	0.628**	0.721**	0.642**	**0.832**			
Perceived value (PV)	0.632**	0.659**	0.604**	0.729**	**0.948**		
Patient satisfaction (PS)	0.636**	0.539**	0.637**	0.635**	0.650**	**0.945**	
Patient behavioral intention (BI)	0.574**	0.526**	0.542**	0.641**	0.673**	0.654**	**0.921**

** : Correlation is significant at the 0.01 level (two-tailed).

5.3 Structural equation model analysis

Structural equation modeling (SEM) has been widely used in social field of research since it was proposed. SEM can directly measure latent variables, allow errors in variables, and verify the overall model, so as to improve the accuracy and reliability of the analysis results. This model can be used to conduct empirical research on the relationship among perceived value, patient satisfaction and other influencing factors, and test the significance of path coefficient.

5.3.1 Construction of structural equation model

In this research, the structural equation model is constructed using AMOS22.0 software, as shown in Figure 5.1. The root mean square error of approximation (RMSEA) and standard fitting index (NFI) are used to test the fitting degree of the model.

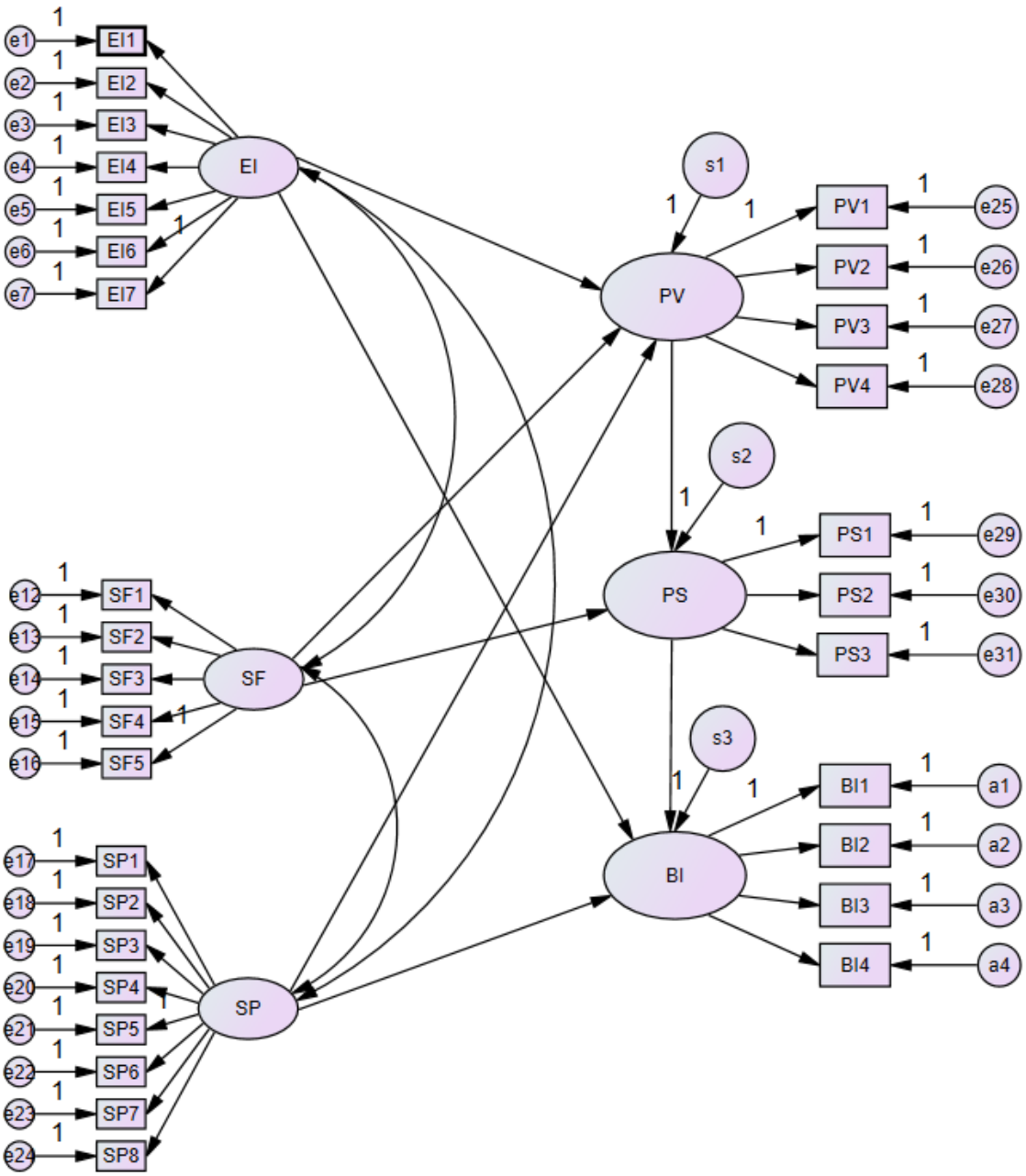

Figure 5.1 Initial structural equation model

AMOS22.0 software is used in this research for structural equation analysis and the acceptable range of goodness of fit is CMIN/ DF < 5, GFI > 0.8, RMR < 0.05, and the smaller the better, RMSEA<0.08 and the smaller the better, NFI>0.8 and the closer to 1 the better, CFI>0.8 and the closer to 1 the better, the smaller the NCP the better when there is 0 value in the 90% confidence interval.

According to the above analysis, the model is constructed regarding the relationship between patients' behavioral intention, satisfaction and perceived service quality. Figure 5.1 shows the path concerning the impact of patients' perceived service quality on behavioral intention. The model includes 31 measurement variables and 6 latent variables. Latent

variables include enterprise image, service facilities, service personnel, perceived value, patient satisfaction and patient behavior intention. Enterprise image includes seven measurement variables: EI1, EI2, EI3, EI4, EI5, EI6 AND EI7; service facilities include five measurement variables: SF1, SF2, SF3, SF4 and SF5; service personnel include eight measurement variables: SP1, SP2, SP3, SP4, SP5, SP6, SP7, SP8.

5.3.2 Modification of SEM

The maximum likelihood estimation is performed on the initial model, and the model fitting degree is obtained through fitting analysis, as shown in Table 5.7.

Table 5.7 Main fit indexes of the initial model

Index	Chi-square test		GFI	NFI	IFI	CFI	RMSEA	RMR
Value	χ^2 1862.642	χ^2/df 4.4.3	0.687	0.823	0.857	0.857	0.118	0.02
Reference value			>0.8	>0.8	>0.8	>0.8	<0.05-0.08	<0.05

Obviously, except RMR, all fitness indexes failed to reach standard. Therefore it is necessary to adjust the structural equation by modifying residual errors, deleting or adding paths, increasing or decreasing observed variables. Table 5.8 shows the MI and *P* values among different residuals. The greater the residual is, the closer the correlation between variables will be. If the MI value is large, it is advised to delete the observed variables.

Table 5.8 Reference table of model modification (partial)

			M.I.	Par Change
s2	<-->	SF	4.596	-.022
s2	<-->	s1	7.468	-.022
s3	<-->	s1	12.213	.031
a3	<-->	a4	4.487	.018
a2	<-->	EI	6.115	.017
a2	<-->	s1	11.482	.023
a1	<-->	EI	4.883	-.016
a1	<-->	s3	5.558	-.020
e31	<-->	a3	8.525	-.015
e31	<-->	a1	5.640	.013
e28	<-->	SP	4.599	-.012
e28	<-->	EI	5.462	.013
e28	<-->	s3	4.488	.014
e28	<-->	a4	8.294	-.021
e28	<-->	a2	4.274	.011
e27	<-->	a2	18.561	.024
e27	<-->	e28	13.923	.016
e26	<-->	EI	6.944	-.017
e26	<-->	s2	7.699	-.020
e26	<-->	a3	8.376	.017
……	……	……	……	……

According to the result of modification index (MI), the residuals with larger Mi value are deleted. After six revisions of MI, E1, E6, E12, E18, E19 and E26 were deleted. After completing the modification of MI, fitting results of the modified model are shown in Table 5.9.

Table 5.9 Main fit indexes of the modified model

Index	Chi-square test		GFI	NFI	IFI	CFI	RMSEA	RMR
Value	χ^2 668.373	χ^2/df 2.427	0.838	0.917	0.950	0.949	0.076	0.017
Reference value			>0.8	>0.8	>0.8	>0.8	<0.05-0.08	<0.05

It can be seen that all the modified fit indexes were desired. In addition, exploratory factor analysis was conducted again after deleting some items in this research, and the analysis results still contained three factors. After deleting certain items, the rest items all met the requirements, so path analysis could be conducted. The modified model is shown in Figure 5.2.

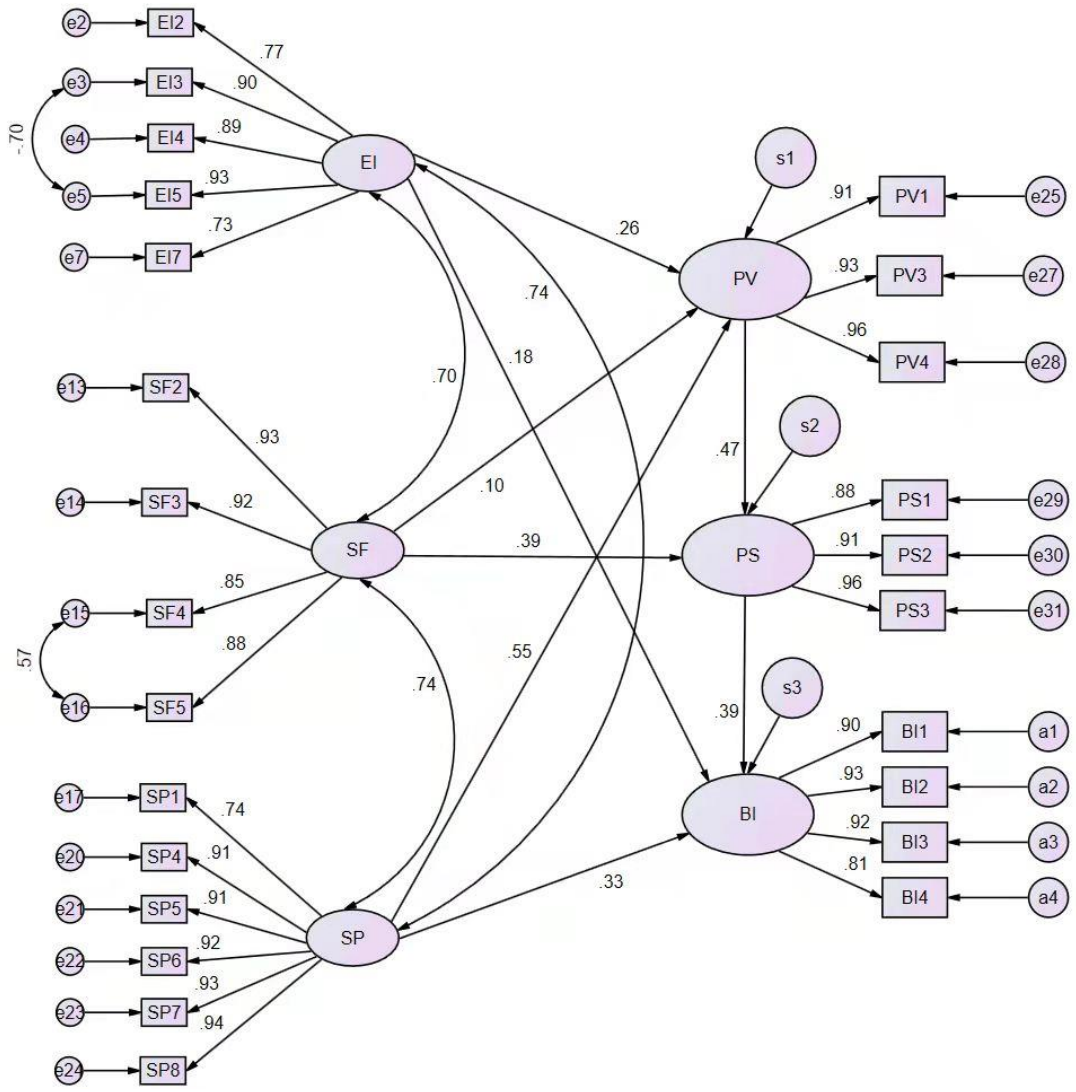

Figure 5.2 Modified SEM and path analysis results

After the model modification and deletion of items, the exploratory factor analysis is run again. The item-deleted scale contains 15 items relating to patients' perceived service quality. The factor analysis is carried out using varimax method and principal component analysis. The KMO value of the samples is 0.919, and the P value in Bartlett's spherical test is lower than 0.05 (p<0.05), indicating factor analysis is very preferred. After factor rotation for 15 items, the common factors with eigenvalues greater than 1 are extracted and three principal component factors are obtained, which is consistent with the results of pilot survey, indicating that the model and the conclusions of hypothesis testing keep unchanged after modification. Besides, the items in each factor match expectations. The cumulative explained variance of the three factors increased to 82.008%, which indicates that the relevance of the items to the indicators has been further improved. Because the factor loading coefficient of all items is above 0.5, the construct validity of the patient perceived service quality scale is high. Combined with the results of reliability analysis, the researcher believes that the validity and reliability of the modified questionnaire are good, which meets the research requirements.

The modifications are as follows:

1. The item EI1 "the hospital is well publicized and enjoys a good reputation" is deleted. Perhaps for fear of hurting the hospital’s feelings, patients generally give the item a high score, but they actually do not know how to judge whether the reputation of the hospital is good or not, which will affect the authenticity of research data.

2. The item EI6 "the hospitals provide health guidance, follow-up service, humanistic care and help for me" is deleted. As the second level indicator under the first level indicator "service mechanism", it is similar in meaning to another second level indicator "hospitals can provide me with special help services beyond treatment". Some respondents also posed such questions. So EI6 is eliminated and EI7 is retained because its connotation is wider.

3. The item SF1 "the treatment equipment is in good condition, and there is no machine failure" is deleted. Due to the regular maintenance, the failure rate of the medical equipment has been controlled within 0.001%. Because all the 245 respondents have given the item the highest score, the data are meaningless to the model analysis. During the treatment, even if the equipment really fails, the hospital often blames it for other reasons. Patients have no knowledge and ability to judge what is happening to the equipment. Therefore, this item is deleted.

4. The item SP2 "the doctor can diagnose my disease accurately and quickly" is deleted. SP2 is the second level under the first level indicator "treatment effect", which is similar in meaning to another second level indicator SP1 "the doctor can accurately and correctly

describe my disease condition". The SP2 is the inevitable result of SP1, so the item SP 2 is deleted.

5. The item SP3 "the hospital guidance personnel can give me full and accurate information about the hospital" is deleted. The items SP3 to SP6 are aimed at evaluating the service attitude of different staff in the hospital from the perspective of patients. The hospital's guidance personnel belong to "staff" in SP6, so the item SP3 is deleted.

6. The item PV2 "the treatment process is pleasant" is deleted. There are two reasons for deleting this item. First, the M.I. value of PV2 is high, so the statistical data of the model needs to be adjusted. Second, PV2 is the result of positive response of PV1, PV3 and PV4.

7. The covariance between residuals e3 and e5 is set because of the M.I. value.

8. The covariance between residuals e15 and e16 is set because of the M.I. value.

After the above modifications, the modified SEM meets the requirements for different indicators, and can be further used for path analysis.

5.3.3 Path analysis

By modifying the structural equation model, the path analysis regarding the impact of patients' perceived service quality on satisfaction and behavior intention is shown in Figure 5.2.

In terms of the path coefficient, if the absolute value of the critical ratio (C.R) is greater than 2 (C.R.>2), it can be considered not equal to zero; in terms of regression coefficient, when the significant level is 0.05, it can be considered different from zero (J. T. Hou & Zhou, 2009). According to Table 5.10, the C.R. value of the path coefficients between variables in the structural equation model is most of them greater than 2, and reaches significance level when $p< 0.01$ (two-tailed test).

Table 5.10 Path coefficients among variables and statistical test

Hypothesis	Unstd.	Std.	S.E.	C.R.	*P* value	Result
EI→PV	0.32	0.26	0.078	4.136	***	Support
EI→BI	0.22	0.18	0.086	2.597	0.009	Support
SF→PV	0.10	0.10	0.062	1.630	0.103	Unsupported
SF→PS	0.36	0.39	0.060	5.873	***	Support
SP→PV	0.58	0.55	0.073	7.971	***	Support
SP→BI	0.36	0.33	0.080	4.515	***	Support
PV→PS	0.45	0.47	0.062	7.154	***	Support
PS→BI	0.43	0.39	0.071	6.010	***	Support

*** indicates passing significance test at 0.001 level (test of two-sided)

The following conclusions can be drawn from Figure 5.2: First, service personnel had the greatest influence on perceived value of the patients, with an influence coefficient of 0.55;

second, service facilities also had a relatively large impact on patient satisfaction with a coefficient of 0.39; thirdly, enterprise image had a certain influence on patients' perceived value as well with an influence coefficient of 0.26; fourth, the effect of service facilities on perceived value was not significant since the influence coefficient was only 0.1.

5.3.4 Analysis of mediating effect

According to Table 5.10, seven impact paths in the model are significant. The perceived value and satisfaction play an important mediating role in affecting service quality and behavioral intention and the patient satisfaction is also significantly affected by perceived value. Therefore, Figure 5.2 is a two-factor causal mediation model, and the bootstrap method can be used to verify whether satisfaction has a mediating effect.

The bootstrap method is a nonparametric re-sampling procedure. The steps are as follows: sampling samples, then putting the chosen samples back and continue to sample samples; repeat the process according to requirements. Generally, the sampling times are more than 1000. Then, the value of ai * bi in each sample and the total mediating effect estimate value are calculated.In this way, the N total and specific intermediate effect values are obtained. They are then ranked from small to large to obtain sequence C and 2.5 percent (LLCI) and 97.5 percent (ULCI) of sequence C are used to estimate the 95% confidence intervals of mediating effect (Wei, 2018). The above results will be affected by the asymmetric distribution of the effect value. Based on this, the researchers construct the bias corrected bootstrap confidence interval estimation method, which makes the results more accurate.

In this research, when the number of random sampling is 2000 and the confidence interval estimation method is used for test and analysis. The confidence level in this research is set at 95%. If value 0 exists in the confidence interval, the mediating effect is not significant (Wei, 2018). The results are shown in Table 5.11.

The results in Table 5.11 are all non-standardized coefficients. It can be found that in terms of the path regarding the indirect impact of service facilities of dental hospitalon patients' satisfaction, the bias-corrected bootstrap confidence interval contains 0, which means that the service facilities have no significant mediating effect. This result is consistent with the conclusion that the service facilities have no significant impact on perceived valuein the path analysis as shown in Table 5.10. The researcher believes that the results of the bootstrap method are more convincing and robust. Therefore, hypothesis H2 in path analysis is rejected

and unsupported. Moreover, the mediating effect of perceived value between service facilities and patients' satisfaction is also not significant, hypothesis H10 is not supported.

As can be seen from Table 5.11, the other two indirect effects observed in this research are significant, so the hypothese H9 and H11 are supported.

Table 5.11 Mediating effect analysis

Effect	point estimated value	S.E.	Bias-corrected Bootstrap confidence interval (95%)		*P*
			Lower	Upper	
EI→PV→PS→BI	0.048	0.020	0.019	0.107	0.000
SF→PV→PS	0.049	0.039	-0.017	0.132	0.150
SP→PV→PS→BI	0.102	0.032	0.053	0.189	0.000

5.4 Analysis of the moderating effect of patient participation

As is shown in Figure 5.3, X represents the independent variable, Y represents the dependent variable and M is a moderating variable. X has a significant impact on Y, and if M can influence the relationship between X and Y, we say M has moderating effect.

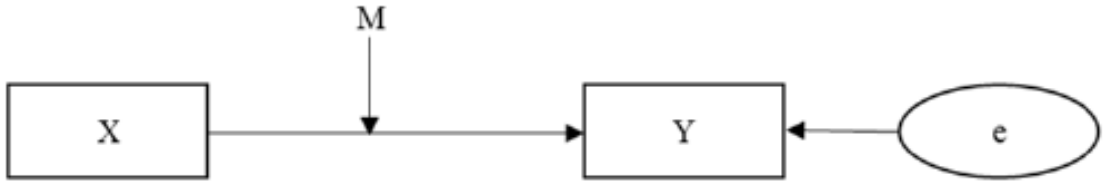

Figure 5.3 Moderating effect diagram

In this research, stratified regressions method in SPSS is used to verify the moderating effect of patients' participation between perceived value and patients' satisfaction. The specific step is as follows: first, the mean of latent variables of perceived value (X), patient satisfaction (Y) as dependent variable and patient participation (M) as moderating variable are calculated and the scores of latent variables are obtained, then X and M are decentralized, and X*M is used as interactive variable. Then multiple regression analysis is performed in which the independent variable X is selected from the first layer, X and M are selected from the second layer, and interactive variable, namely X*M is selected from the third layer. Finally, by analyzing the significance of the variation of R^2 value in the results of each layer, whether M has the moderating effect can be measured.

According to the regression results in Table 5.12, the regression results of the first lay show that p=0<0.05 and the standardized beta coefficient is 0.699, which means that perceived value has a significant impact on patient satisfaction; the regression results of the

second layer show that the significant level of patient participation is 0<0.05, which indicates that patient participation has effect on patient satisfaction; the regression results of the third lay show that *P* value of the interactive variable (X*M) is greater than 0.05, indicating the moderating effect of patient participation is not significant.The hypothesis H12 is not supported.

Table 5.12 Analysis and test of the regulating effect of patient participation on perceived value and patient satisfaction

	Model	Non-standardized coefficient		standardized coefficient	t	Sig
		B	Standard error	Beta		
1	(Constant)	1.518	.182		8.351	.000
	Perceived value	.650	.043	.699	15.245	.000
	R=.699; R^2=.489; Adjusted R^2=.487; Variation of R^2=.489; Variation of F=232.424; *P*=.000					
2	(Constant)	1.126	.201		5.596	.000
	Perceived value	.492	.057	.528	8.612	.000
	Patient participation	.246	.061	.248	4.041	.000
	R=.722; R^2=.521; Adjusted R^2=.517; Variation of R^2=.521; Variation of F=131.711; *P*=.000					
3	(Constant)	1.767	1.211		1.459	.146
	Perceived value	.334	.298	.359	1.121	.263
	Patient participation	.095	.288	.095	.329	.743
	Perceived value* Patient participation	.037	.068	.296	.537	.592
	R=.722; R^2=.522; Adjusted R^2=.516; Variation of R^2=.001; Variation of F=.288; *P*=.592					

Chapter 6: Conclusions and Suggestions

6.1 Discussions on research results

With the patients in a dental hospital in China as the research object, this research focuses on studying the impact mechanism among patients' perceived service quality, perceived value, satisfaction, and behavioral intention in order to provide a theoretical basis for the private dental hospitals to improve management and service quality. The improvement of patient satisfaction and subsequent positive behavior intention can bring social and benefits to hospitals and enhance hospital competitiveness.

This research is based on the theoretical model depicted in Figure 3.1, which is constructed based on ECSI Martensen et al. (2000) focusing on impact path " perceived service quality-> perceived value-> satisfaction-> behavioral intention", with patient participation as the moderating variable between perceived value to patient satisfaction (Ennew & Binks, 1999; Geng, 2008; Guo, 2016). Patient satisfaction is the result of comparing the perceived service quality and expectations, some scholars have conducted in-depth research on its relationship (Ostrom & Lacobucci, 1995; Wei, 2003; Z. L. Yang et al., 2004). The purpose of this research is to discuss the actual feelings and behavioral intention after receiving dental treatment in order to measure the patients' overall satisfaction. Therefore, the variable patients’ expectation in the ECSI model has not been involved in this research.

6.1.1 Theoretical analysis results

After extensive literature review, the research explores the impact mechanism between service facilities, enterprise image, perceived value, service personnel, patients' behavioral intention and satisfaction from the perspective of dental health services, constructs the theoretical model, and proposes some hypotheses. With 245 patients in surveyed hospitals as the research objects, the empirical analysis is conducted using a combination of methods such as regression analysis, structural equation modeling, descriptive statistical analysis, and reliability and validity analysis. The research conclusions are as follows:

1. The dental perceived medical service quality evaluation index scale is constructed. Based on treatment process analysis, expert interviews and referring to relevant mature scales, the scale is developed to measure the service quality of dental institutions, which includes three dimensions, namely, service personnel, service facilities and enterprise image and 20 indicators.

2. The demographic factors such as education level and age have different significant effects on patient behavior intention and perceived value. Therefore, dental institutions should provide diversified and personalized services for different kinds of patients.

3. The correlations between behavioral intention, satisfaction and perceived service quality of patients are analyzed and confirmed. The results show that there is no positive relationship between service facilities and dental patients' perceived value, so the mediating effect SF→PV→PS is not supported. The indirect and significant impact on patient behavior intention through the path EI→PV→PS→BI and SP→PV→PS→BI is supported.

4. According to the analysis of variance and descriptive statistics, the overall level of patients' participation is moderate, and does not vary according to kinds of patients. According to the mediating effect analysis, patients' participation has no significant moderating effect and the impact of perceived value on patient satisfaction does not change significantly with PP as moderating factor.

Based on the literature, we proposed that enterprise image, service facilities and service staff have a positive direct effect on perceived value and patient satisfaction. Moreover, we also proposed that patient satisfaction and perceived value are mediators of the relationship between perceived quality and patient behavioral intention. The results support most of our hypotheses with the exception of the following aspects: service facilities of dental medical institutions, an important element for perceived service quality, have no obvious direct impact on perceived value and indirect impact on patient satisfaction; patient participation is not a significant moderating variable of the impact of perceived value on satisfaction. The moderating effect is not marked, although it does exist.

6.1.2 Outcome analysis

According to the above results about hypotheses, the research reaches the following conclusions:

1. Results of descriptive statistical analysis

Descriptive statistical analysis is conducted to explore whether demographic factors have significant different effects on perceived service quality, behavioral intention, patient participation, patient satisfaction and perceived value. The results show that gender has no effect on different variables. In terms of the impact of age on EI, PP, SF, SP and PS, the significance test results show that $p > 0.05$, which indicates that the age has no effect on EI, PP, SF, SP and PS. For the significance test of PV and BI, $p < 0.05$, there is significant difference between patient groups. Analysis results show that educational background and occupations have no effect on the research variables. The K-means clustering analysis shows that the discrimination of cluster centers among groups is the highest when k=3. The results of single factor ANOVA analysis show that there are significant differences among the groups.

Although there is a large body of research on patients' satisfaction and behavior intention in dental hospital, there is no difference regarding the connotation and research methods of patients' satisfaction (Gevers, 2001; Gong et al., 2015; Ye & Lin, 2006; A. L. Zhou et al., 2013). Gao (2018) at Shandong University conducted a systematic study on how to improve the outpatients' satisfaction in dental hospital, without touching on the impact mechanism between patients' behavioral intention, satisfaction, perceived value and perceived quality. Foreign Studies on patient satisfaction mainly focus on the effects of different development stages of medical institutions on patient satisfaction. The research objects are basically selected from large public hospitals, excluding specialized dental hospitals (F. W. Wu et al., 2009). Based on demographic factors, Tucker JL analyzed the influencing factors of satisfaction from multiple perspectives, including health condition, marriage, education level (Tucker III & Kelley, 2000). The statistical analysis of Chinese patients is mainly completed by the National Bureau of Statistics and the National Health Commission of the People's Republic of China, which is used to formulate health policies, such as the Action Plan for Oral Health Care (2019-2025) (National Health Commission of the People's Republic of China, 2019). These statistical analyses focus more on qualitative analysis and theoretical discussion, and less on quantitative analysis and empirical studies. Moreover, there are a lot of repetitive studies, without reference to foreign research models. Meanwhile, studies on Chinese dental health conditions and patients are rarely found (Ding et al., 2008). A few Chinese scholars have discussed the impact of demographic factors on patient satisfaction. For example, Dou (2009) found demographic factors, hospital conditions and statistical means have effect on patient satisfaction, thus affecting patients' behavior intentions. Zhan and Wei (2000) verified the impact of age, occupation type, education background and

disease type on patients' behavior intention and satisfaction using single/multiple regression analysis.

2. Discussion on the results of structural equation model analysis

The structural equation model is used to test the hypotheses from H1 to H8. The results are shown in Figure 5.2. According to the results, hypotheses H1, H3, and H8 are supported. Specifically, service personnel of dental institutions have a significant positive impact on patients' behavioral intention and perceived value and the path coefficient is 0.33 and 0.55 respectively. The perceived value has a significant positive impact on patient satisfaction and the path coefficient is 0.47. The service facilities have a significant positive impact on patient satisfaction and the path coefficient is 0.39. The patient satisfaction has significant positive impact on patient behavior intention and the path coefficient is 0.39.

3. Discussions on mediating effect

This research uses the bootstrap method to verify the two-factor causal mediating effect in model (see Figure 5.2), and the results show that it is a full mediating model. The bias-corrected Bootstrap confidence interval of the path regarding the indirect impact of service facilities on patient satisfaction includes 0, which indicates that the mediating effect is not significant and therefore hypothesis H10 is not supported. Hypotheses H9, H11 are supported.

Based on the second and third research results, we surprisingly found that service facilities have no significant positive effects on patient satisfaction, and the mediating variables of perceived value have no significant positive effects on satisfaction. An analysis of the reasons shows that Chinese people generally think hospitals with a longer history have a higher medical level and seasoned doctors with high medical skills, though their service facilities are often old and outdated. There is no denying that new and advanced service facilities can bring positive experience to patients, but what they care the most is the treatment effect and service attitude. Therefore, in China, you can see that although some large public hospitals are poorly equipped and located in unfavorable places, they are still flooded with patients. This needs to be further discussed in future research. For example, the question corresponding to the item SF1 in the research questionnaire is expressed as “Treatment facilities are in good conditions, with no faults in operation”. The data collected concerning this question is the basis of the research conclusion. The results might be different if the question is rephrased as “Treatment facilities are advanced and in good operation”. This can be further discussed in future research.

4. Discussion on the moderating effect of patient participation

Hierarchical regression method is used to verify the moderating effect of patient participation between patients' satisfaction and perceived value in dental institutions. According to Table 5.12, after introducing the interactive variable (X*M) into the third layer of the regression model, the *P* value in significance test exceeds 0.05（$p>0.05$）, which indicates that the patient participation does not have significant effect. Therefore, Hypothesis H12 is not supported. Many scholars have revealed in their studies that there is a positive correlation between the degree of patient participation and the sense of control, satisfaction, and immersion during the treatment process. Therefore, the higher the evaluation of perceived service quality, the better the service quality (Ennew & Binks, 1999; Guo, 2014; T. H. Guo & Tang, 2011; Saunders, 1995). However, patient direct participation is considered as a variable, and its moderating effect on the impact of perceived value on satisfaction has not been discussed in these studies.When exploring the relationship between patient perception of remote service quality and behavioral intention, Wei (2018) studies the moderating effect of patient participation on service quality and patient satisfaction and reached similar conclusions as this study - the moderating effect of patient participation is not that significant.The reason lies in the popularity of medical knowledge and the openness of institutions. Although patients want to participate in the diagnosis and treatment process, they do not know how to participate well and can only passively accept the arrangements of medical staff, which led to low-degree patient participation and insignificant moderating effect.

An analysis of reasons found that whether the patients participate in the treatment process or not does not matter much. Oral diseases can be clearly and accurately diagnosed and treated and therefore there is little space for patients to play a role in it. Based on this, the moderating effect of PP between perceived value and patient satisfaction is not significant, and hypothesis H12 is rejected.

In summary, 12 research hypotheses are proposed in this research. Three hypotheses are rejected and the others are supported. The unsupported hypotheses include: H2 "the service facilities of dental institutions have a positive direct impact on perceived value", H10 "the service facilities of dental institutions have positive indirect impact on patient satisfaction with perceived value as mediating variable, and H12, “the patient participation plays a positive moderating role between perceived value and satisfaction”. The results are basically consistent with the expectations of this research. Wei (2018) conducted a study on the relationship between patients' perceived telemedicine service quality and behavioral intention, and put forward 10 research hypotheses. The results showed that two hypotheses are rejected.

On the basis of Wei's hypotheses, this research believes that perceived value and satisfaction are the mediating variables in the process where perceived service quality affects behavioral intention. Besides, this research also verified that patient participation has no significant positive moderating effect between medical service quality and patient satisfaction. Although the results are similar to Wei's, the research object, research model and research hypothesis of this research are quite different. Wang (2018) and Meng (2012) explored the relationship among perceived service quality, satisfaction and behavioral intention from the perspective of exhibitors and visitors respectively. The results found that the exhibition facilities have a significant positive impact on the satisfaction of exhibitors and visitors, which is inconsistent with the test result of H2 in this research. The obvious reason is perhaps the research objects are different. Besides, both studies found that the exhibition services have no positive impact on the satisfaction of exhibitors and visitors, which is also different from the research results of this research. This research believes that medical services have a direct and significant impact on patient satisfaction. Li (2016) explored the relationship between perceived service quality, behavioral intention and satisfaction, and confirmed the impact relationship between them and the mediating role of satisfaction. The H1, H3 and H6 in this research are also tested by the scholar. Baker and Crompton (2000), Chen and Dubinsky (2003), Severt et al. (2007), Yi (2006), and Zeng et al. (2018) also conducted similar studies. The studies by other scholars mentioned have reached conclusions similar to this research, but the difference is that the research subjects of this research are dental patients and meanwhile the hypothesized mediating effect of perceived value and satisfaction and the patient participation as a moderating variable are discussed, which are absent in the studies of other scholars. Some of the verification results of hypotheses of this research can actually be predicted during the literature review, which is basically consistent with the conclusions of previous similar studies.

6.2 Suggestions on hospital reform

6.2.1 Research conclusions

Based on the above conclusions, this research believes the private dental hospitals should improve medical service from the following aspects:

1. Priority should be considered when improving the quality of oral medical service

The research results show that different influencing factors have different effects on perceived value, satisfaction and behavioral intention. The perceived value and patient satisfaction can affect patients' behavior intention. Overall, the most important influencing factor is service staff, followed by enterprise image and service facilities. Therefore, hospital managers should give different priorities to the influencing factors in order to gain the biggest social and economic benefits with least cost input.

The quality of service staff can be improved from the following four aspects: 1. Establish patient-centered concept, improve the medical service standards and service attitude, and enhance medical staff's service awareness and medical ethics. 2. Reduce the non-technical risks and improve medical staff's medical skills. 3. Respect and protect the privacy of patients, and build a harmonious doctor-patient relationship. 4. Improve the personalized and humanized service. Provide personalized services for patients according to their individual conditions, for example referral service, rehabilitation service and follow up service post treatment.

The hospital can improve the enterprise image from the following four aspects: 1. At present, China's dental health service is still in its infancy with a single service mode, and the geographical location of hospital, patient's education background and age have significant different effects on patients' perception of research variables. Therefore, dental hospitals should use various criteria to create target market segments and approach each segment differently, after fully understanding the needs, demographics, and personality of the target consumer. 2. The hospital should purchase medical equipment, technology or network services from suppliers with a higher reputation. If a third party hospital is needed to participate in the treatment, responsibilities should be clearly defined for the three parties including patients. Meanwhile, the inviting hospital and invited third party hospital should learn from each other. 3. The hospital should reasonably price the treatment price and provide medical benefits so that the dental health service will be more cost-effective; besides, actively optimize the supply chain and control the price of medical consumables, so that the patients can afford to consume the dental services. 4. Standardize diagnosis and treatment procedures and quickly respond to medical disputes and patients' complaints; provide reliable and effective treatment for elderly patients to enhance their trust; provide health education and knowledge for patients with low education level in order to improve their perception of service quality. For patients who are far away from the high-quality hospital, community grassroots dental health centers should be established; provide referral service, family rehabilitation services and remote consultation services. Before treatment, patients should be

fully informed of and agree with the treatment scheme, treatment cost, treatment effect and possible adverse consequences; establish network knowledge-sharing platform or hold regular expert lectures to popularize dental knowledge.

In terms of service facilities, the hospital should improve them from the following four aspects: 1. the medical equipment should be standardized and fully equipped 2.provide newspapers, magazines, drinks for waiting patients; provide voice calling service; establish a comprehensive information sharing platform so that patients can fully understand the treatment methods and costs; further improve the privacy protection measures to ensure that the patient's privacy information is fully protected. 3.provide polite and considerate services 4. If necessary, special bus should be provided for patients who are far away from the hospital.

2. Pay attention to the perceived value

Perceived value has been proved to play a significant mediating effect between perceived service quality and behavioral intention. Therefore, the managers of dental institutions should pay particular attention to the role of perceived value. Apart from actively improving the quality of service, the managers should also think in patients' position and seriously consider the patients' cost and time input in the treatment. Therefore, they should quickly respond to the application of medical needs of the patients, shorten the waiting time, improve the positive experience of treatment; standardize and simplify the diagnosis and treatment process; align the medical cost with the local economic level, so as to reduce the economic burdens of patients; meanwhile, include the telemedicine service fee into the local medical insurance.

3. Attach importance to the role of patient participation

Although this research concludes that the moderating effect of patient participation between satisfaction and perceived value is not significant, we believe that it is because the patients have little knowledge about the dental medicine. With the patients paying increasing attention to the service quality, hospital managers should give full attention to the patient participation and actively guide patients to participate in the whole treatment process. Besides, they should provide oral health education for patients and harmonize the doctor-patient relationship by carrying out recreational activities, and establish the knowledge sharing and communication platform, so that patients can fully understand the information related to their immediate interests.

6.2.2 Measures to improve the patients' satisfaction and affect their behavior intention

According to the research conclusions, this research proposes suggestions on how to improve the service process of the hospital as follows: first, the hospital should maintain the advantageous services patients are satisfied with; secondly, concentrate on improving the services that patients have unfavorable opinions and give low scores; thirdly, for the services patients are very satisfied, it is advised to reduce the investment; fourth, for the services that the hospital pays no attention to and meanwhile the patients give negative evaluation, the managers should analyze the reasons and take measures to improve them. Based on the research results and models of this research and referring to the continuous quality improvement theory (CQI), this research has developed a set of strategies to improve patients' satisfaction and affect their behavioral intention.

The theory of continuous quality improvement (CQI) is anupgraded version of total quality management theory (TQM), which emphasizes the quality control of all links and processes (Edwards et al., 2008). On the basis of overall quality management, the following questions are put forward: can the efficiency of oral health service be improved continuously? Can the treatment effect be more significant? Can the service be provided more timely? Can the speed of medical services be quickened? CQI requires the management personnel to identify, analyze and solve problems timely. It is required to correctly understand the customers' needs at the very onset. Therefore, the theory plays a guiding role in improving the service quality and patient satisfaction.

Based on CQI theory, customers in dental hospitals can be further subdivided into internal customers and external customers.External customers refer to patients, and internal customers refer to medical staff. This theory holds that hospitals are the providers of medical service and different people are the receivers of service. The CQI is implemented through FOCUS-PDCA method (Grönroos, 2000). Focus is the basis for PDCA cycle, including finding a process for improvement, organizing a team that knows the process, and clarifying current knowledge of the process, understanding sources of process variation, selection of a process improvement. By effectively performing the FOCUS, the PDCA cycle of quality management can be continuously pushed forward.

In order to improve the satisfaction of patients, we can build a quality management system regarding patient perceived service based on CQI theory. According to the research model in this research, the perceived service quality is affected by service facilities, service personnel, and the enterprise image. These three factors directly affect the patients'

satisfaction. Moreover, the patients' expectation, or perceived value, also affects the patients' satisfaction. According to CQI theory, this research seeks to improve perceived service quality in three stages, including investigation, analysis and suggestions for quality improvement. Firstly, establish the enterprise working mechanism using the FOCUS PDCA method, and the quality management of perceived service of patients is carried out continuously; secondly, further improve the enterprise image, optimize the service facilities, strengthen the training of service personnel, standardize the service process, improve the patient participation, strengthen the interaction and communication with patients, effectively optimize the price system of medical services, improve the convenience of medical services and improve the service environment. The specific measures are as follows:.

1. Establish a long-term mechanism to improve and maintain the perceived value of patients.

The perceived value plays a mediating role between the perceived service and patient satisfaction. The improvement of the perceived value of patients takes time. According to CQI theory, the effective measures to improve the perceived value of patients include:

First, establish a management team mainly responsible for improving the perceived value with relatively high management authority. At present, in the surveyed hospital, the outpatient department is tasked with the survey and analysis of patient satisfaction in a part time role with low management authority. The improvement suggestions proposed by the outpatient department often get little attention from other departments. Therefore, it is advised to establish a professional team led by core management to analyze and improve the patients' perceived value in order to boost the patients' confidence and trust in the hospital and foster their intention of visiting the hospital again.

Secondly, according to the FOCUS-PDCA method, the hospital should establish an effective work process and related mechanism. CQI theory provides a way of continuing to improve service quality, which is a cycle from identifying, analyzing and solving problems. Establishing a scientific and reasonable management system of patient perceived value can reduce the human factors in the process of treatment in favor of the benefits of patients. The specific measures are as follows: first, formulate reasonable job tasks and objectives; secondly, optimize and integrate the service process and conduct investigation, analysis of patient satisfaction, and address the concerns of patients according to PDCA cycle, and establish the coordination mechanism among the relevant responsible parties; third, establish performance evaluation system and feedback the perceived value and satisfaction of patients in real time.

Third, establish the evaluation criteria of patients' perceived value and include it into the overall performance evaluation system of the hospital. The evaluation regarding perceived value can help service staff improve the service consciousness and attitude in an aim to improve patient satisfaction and increase their intention of purchasing the service again. The specific measures include: firstly, according to the current situation of the surveyed hospital and the investigation of this research, the hospital should formulate specific evaluation indexes, working rules based on full communication with service personnel to ensure the evaluation is more humanized and reasonable; secondly, the management team especially responsible for the perceived value of patients' shall formulate rewards and punishments measures and link up the promotion, bonus and award with performance of medical employees; thirdly, establish a mechanism ensuring regular investigation, regular report and regular communication, timely feedback the evaluation results to the management, and strengthen the response efficiency of the hospital to the needs of patients.

2. Improve patients' perceived service quality

The perceived service quality can be improved from two aspects: service facilities and service personnel. In terms of service facilities, the hospital can introduce a series of facilities and equipment to improve the service level. The hospital management information system has provided great convenience for patients and medical staff. At present, an increasing number of dental hospitals collect, input, manage patients' information using information management system; besides, registration, waiting for treatment, physical examination and treatment process, as well as the management of drugs, instruments and equipment largely rely on the management information system. The integration of App Alipay and WeChat into the hospital management system can extend the hospital service to the outside of the hospital. Now the management equipment has become an important symbol of the hospital modernization level. Many dental hospitals have integrated intelligent equipment into the hospital operation system since their establishment. The improvement measures include:.

First, introduce the widely used information management system but not limited to those used only in dental industry. Many software systems need to be redeveloped according to the actual situation of different hospitals, so the similar systems of other types of hospitals can also be used. Hospitals with high level of informatization have developed a mature and stable management information system. The surveyed hospital in this research should send personnel to hospitals with a higher level of intelligent information management to learn the successful experience and build information talent team, so as to improve the efficiency and quality of hospital information system.

Second, the purpose of establishing a hospital management information system is to provide better service and improve the perceived service quality of patients. Therefore, full analysis of patients' satisfaction can better understand the service quality of different departments, and thus provide the basis for formulating the improvement measures.

Third, in the era of "big data", the hospital should keep pace with the times to introduce cloud computing and big data technology to improve the ability of hospital information system. The application of big data and cloud computing can help the hospital to improve the management level and provide reference data for decision-making. For example, the financial big data analysis can help optimize the operating cost of the hospital, rationalize the service price; the establishment of casebase based on big data analysis of patients' medical records can offer support for doctors' quick diagnosis; big data can help establish the relationship between different oral diseases with specific groups thus providing data support for predicting the potential diseases and identifying high-risk groups.

Fourth, introduce advanced medical equipment. No matter how good doctors are, they cannot provide satisfactory services for patients without the help of medical equipment. Meanwhile, excellent medical equipment can help improve the service quality. By embracing the patient-centered concept, the hospital should appropriately purchase the necessary medical equipment but remember to avoid the blind purchase without considering the actual requirements. Besides, the hospital should introduce medical equipment according to the actual situation, make the equipment purchase plan and reasonably control the cost.

The service quality of service staff can be improved from the following four aspects:

First, further strengthen the medical skills of doctors. With the preferential policies of local governments and according to its own development needs, the hospital can introduce high-caliber talents at home and abroad, so as to improve the service level of medical departments; actively cooperate and exchange with famous universities and hospitals at home and abroad, and send medical staff to study in other hospitals or research institutions; cultivate a group of multi-level medical teams with senior, middle-aged and young doctors who are competent, responsible and innovative; establish internal training and mentoring mechanism; build internal academic and information exchange platforms and promote the sharing of diagnosis and treatment data; formulate codes of conduct and restrict the behavior of medical staff; raise the medical staff’s awareness to protect the patients' privacy; improve the technical specifications of medical services in order to reduce the non-technical risks in the process of treatment; strengthen the professional skills training for doctors, nurses and technicians, install the three-tier treatment system including the outpatient doctors, attending

doctors and academic leaders so as to control the service quality at all levels. Another effective way to improve professional skills is to cooperate with other high-quality medical institutions, introduce their excellent teams, learn from each other for mutual progress, and carry out teaching demonstration activities. On the other hand, it is necessary to improve the service level of nurses. Nurses are not only playing a supporting role in the whole treatment, but also the direct provider of dental care. Although the interactions between patients and nurses in outpatient departments are not as much as that in the inpatient department, improving the nursing service level is still an important way to improve the perceived service quality. The surveyed hospital should improve the nursing service level of nurses from three aspects: first, clearly define the post responsibility, tasks and quality standards of nurses at various levels and directly link up the nursing service level with actual performance; formulate training plan and provide targeted trainings for nurses responsible for different types of nursing services; increase nurses' sense of self-identity and post responsibility; learn the nursing service experience from advanced hospitals, formulate professional nursing manuals, formulate service standards for nurses, and ensure the earnest implementation.

Second, the service attitude of employees in dental institutions directly affects the patients' perception of the service quality and further impacts the doctor-patient relationship, which not only reflects the overall moral level of medical staff, but also indirectly reflects the management level of the hospital. The hospital staff's service attitude can be improved from service consciousness, mechanism and cultural environment. First, it is necessary to strengthen the fostering of medical ethics, and improve employees' mentality, professional quality and moral quality; show respect for patients' privacy, and build a harmonious doctor-patient relationship. Patients' privacy can be effectively protected by introducing high-end information protection technology system and providing one-to-one treatment room.

The hospital should strengthen doctors' awareness of the importance of improving service attitude, increase doctors' sense of urgency to improve service attitude by means of performance assessment and ideological education. The management also needs to realize that the improvement of medical ethics is a long-term effort, so it is necessary to establish an internal training system and integrate medical ethics into the enterprise culture. In practice, a combination of measures should be taken, for example, set exemplary worker model and deeply reflect on negative examples.

The management must realize that oral education is not enough, so it is necessary to establish corresponding management mechanisms and rules to link service attitude of service staff with rewards and punishments. For example, establish a scoring system for patients to

evaluate the service attitude of medical staff and take concrete measures to staff with poor service attitude and reward their peers with good attitude.

The managers should analyze the influencing factor of service attitude of service staff and create a favorable working environment for them; form a community with shared interests between employees and the hospital, and link individual goal with the long-term goal of the hospital; the work tasks and workload of medical staff should be moderate to balance between work and leisure; the people-oriented corporate culture can give full play to the initiative of medical staff in order to enhance their sense of work engagement and sense of ownership.

In addition to the medical team, the hospital should establish a customer service department to deepen the contact with patients and strengthen the stickiness of patients. The customer service department includes receptionists, telephone consultants, network consultants, new media consultants, hospital consultants and postoperative follow-up staff. The front desk receptionists should provide reception service for the patients who have made an appointment for treatment, and remind them of the appointment time and tell them the travel route to the hospital. Through telephone, Internet, new media or face-to-face communication, the consultants can answer any questions from patients about oral disease treatment, prevention, healthcare and knowledge popularization. After the treatment, the follow-up service staff should inform the patients of the post-treatment precautions, and understand their experience, satisfaction, opinions and suggestions, and postoperative adverse reactions, so as to report the patients' responses to the hospital management for analysis and improvement. By providing one-stop service throughout the whole process of the treatment from online consultation to warm and thoughtful reception, to professional and meticulous treatment to postoperative follow up service, every department of the hospital has a strong sense of service, so that patients become loyal customers of the hospital.

Third, effective communication is critically important to the harmonious doctor-patient relationship. Through the survey, it is found that although the mediating effect of patient participation on patients' perceived value is not obvious, the effective and full communication can solve the problems causing the dissatisfaction of patients.

In order to establish good communication channel between doctors and patients, efforts should be made from the following several aspects: improve the awareness of active communication of doctors through training and require doctor to fully communicate with patients about the diagnosis plan, disease conditions and treatment scheme so as to ensure patients' right to know, right to choose and privacy rights; take a good attitude in communication and let patients fully realize that doctors are thinking in their position so as to

establish patients' trust in medical staff and increase their satisfaction. In some non-critical decision-making matters, the doctors should give more space for patient participation.

However, good communication cannot only rely on the willingness and consciousness of doctors and patients, it is necessary to establish relevant mechanisms and communication channels such as notification mechanism, feedback and complaint mechanism. The notification mechanism refers to the publicity of medical service information, such as the charging standards. The complaint mechanism is a feedback channel linking hospitals and patients through which the hospital can collect the patients' advice, opinions and complaints from WeChat official account, complaint telephone and suggestion email box and then effectively address the patients' complaints in order to improve the hospital service quality.

Fourth, the hospital needs to provide value-added services for patients, such as regular lectures on tooth care knowledge, which can be broadcast through the website or face-to-face teaching; invite children to learn the knowledge of protecting teeth in the form of experience camp; organize member day activities. The value-added services also include personalized and humanized services for patients according to the actual conditions. For example, if the patient is unable to visit the hospital for physical reasons, the hospital will send medical staff to the patient's home for treatment; if the local dental medical level is too low, the hospital will arrange referral service for the patients or invite other experts to the hospital for disease consultation.

3. Establish a good enterprise image

The enterprise image can be evaluated from two aspects: whether the medical service is fair, open and equitable and whether the medical environment is good. According to the investigation of this research, the patients still have negative opinions on the service delivery mode. They think that the service prices are too high and the medical materials actually used are not what the doctors claim to use. The hospital internal investigation shows that there are no inflated costs and false items, but the service price does have room for adjustment.

In order to establish a good enterprise image, the hospitals should first strengthen service pricing management, enhance the transparency of charges, and set different prices for different people. Therefore, it is necessary to price the basic level oral services in strict accordance with the relevant national regulations and policies. We should establish pricing strategies for different market segments and provide optional value-added services for high-end people. In order to make the service price more transparent, the service employees are required to be familiar with the price of main service items, so that they can timely answer the patients' questions about charges, and give constructive consumption opinions. The

hospital should also increase the supervision on service prices, and any problems related to abnormal prices should be timely reported, solved and rectified. There should be staff especially responsible for patient complaints. Moreover, the hospital should fully fulfill its social responsibility and reduce the medical expenses of some poor or critically ill patients. Most of the oral medical expenses in China are not covered by the reimbursement system of medical insurance. Therefore, patients often receive oral health service at their own expenses. By cutting the medical cost for poor patients, the hospital image and reputation can be quickly improved. The kindness can help establish a good relationship with the government and get greater support from the government. The establishment of chain stores can enhance the enterprise image and patients' trust. The active participation in public welfare activities and the network promotion can also enhance the enterprise image, which has a positive effect on patients' perceived service quality and fosters the patients' trust.

In terms of the medical environment, the surveyed hospital of this research is a private chain hospital, which has a clean and tidy medical environment. However, the needs of patients are different and therefore it is necessary to improve the medical environment from different aspects. First, it is necessary to improve waiting facilities to show humanistic care for waiting patients, such as special seats for children, pregnant women and the elderly, serving drinks, newspapers and magazines, playing TV, placing green plants in the waiting area, and providing free WIFI services. Meanwhile, there should be full time service personnel responsible for maintaining the waiting order, guiding patients to the outpatient rooms, answering patients' questions and appeasing patients' emotions. Secondly, strengthen the on-site 5S management and set clear public signs. The hospital public facilities that have been used for a long time and are aging should be regularly replaced; the medical places should be inspected regularly and disinfected in order to provide a safe medical environment for patients during the epidemic period. Finally, the logistics services, including parking, food, mother and child rest, should be also strengthened. It is advised to encourage employees to commute by public transportation, so as to provide more parking spaces for patients; Establish cooperative relationship with surrounding restaurants to provide convenience for patients to eat foods; special rest facilities for mothers and babies should be set up to provide more convenience for pregnant women and children.

Based on the research of patients' perceived service quality, patient satisfaction and behavioral intention, this research puts forward a series of hospital improvement measures based on the survey results. According to CQI theory, this research proposes to improve service quality from mechanism construction, improvement of perceived service quality and

establishing good enterprise image. In order to improve the perceived service quality, the hospital should think in patients' position and fully understand the patients' psychological state and expectations, appropriately encourage "pessimistic" patients, and keep "optimistic" patients from being excessively optimistic, and provide diversified services for different market segments. Patients care very much about their own rights. The hospital should fully protect and respect the patients' right to know, privacy rights and the right to choose, so that patients can moderately participate in the treatment plan and thus make the treatment plan better match the economic level and actual conditions of patients.

6.2.3 Suggestions on relevant policies of dental healthcare in the new situation

As the providers of medical service, the hospitals are subject to the supervision of market regulators and the relevant national policies. At present, there are still many problems in the healthcare reform, and the research found many medical behaviors in violation of current medical policies, which are summarized as follows.

1. Some departments of medical institutions fail to implement the relevant national regulations, norms and mandatory requirements

Some departments in dental hospitals fail to comply with the relevant government regulations and provisions. For example, doctors and nurses do not separate their personal belongings (such as mobile phones) from the medical equipment during the treatment process, which is not in line with the Provisions of the Technical Specification for Disinfection of Dental Instruments in Medical Institutions (2005).

2. No regular cleaning and disinfection and relevant tests are carried out

Dental hospitals should carry out regular disinfection with medical equipment and environment to ensure that their hygiene meets the national standards, and pass the biological, chemical and technological test. If the chemical sterilizer is used, the concentration and colony level should be tested timely according to the relevant regulations. Especially in the times of COVID-19's global outbreak, medical institutions as a densely populated area should strengthen regular sterilization and safety assessment.

3. Use temporary personnel in place of professional health technicians

The dental hospitals are often flooded with patients, causing long waiting time and insufficient service. In order to improve the service quality, the dental hospitals often employ temporary staff to provide services in place of professional health technicians, including

interns, nursing and service employees who have not obtained the nursing and physician qualification certificate.

4. Publish false medical advertisements to expand the publicity effect

The practice is commonly seen in private dental institutions, which mainly takes the following forms: publish exaggerated advertising without obtaining the medical advertising review certificate; use the words that are not forbidden in the advertising law or "Medical Advertising Review Certificate" in the advertisements. In order to attract more potential consumers, the advertisement contains the contents of inducing and misleading consumers.

5. Sell products or services beyond the scope of business registration

In 2016, the *Administrative Regulations on Medical Institutions* issued by the Chinese government clearly stipulates that medical institutions shall apply to original registration authorities for changing registration in case of any changes in the hospital level and service scope (State Council of the PRC, 2016a). However, the investigation of this research found that some special service departments such as radiology department and X-ray examination were put into operation earlier before their business licenses are approved; this is true of the oral implant and oral medical cosmetology services.

The above problems existing in the reform of dental healthcare can affect the patients' perception of medical institutions. Therefore, the dental hospitals should not only take multiple measures to improve patients' perceived service quality and satisfaction, but also observe the national policies and regulations to provide high-quality oral medical services for patients. In the current national healthcare reform policy, establishing hierarchical treatment system and relaxing the occupational restrictions of medical staff in public medical institutions are the most discussed topics. By promoting the flow and full use of high-quality medical resources in the dental field, we can provide high-quality services for patients through medical insurance, supply and supervision. The reform measures of establishing diagnosis and treatment system, relaxing the occupational restrictions of medical staff and strengthening supervision have been implemented in western developed countries, but they all progress slowly.

Based on conclusions of this research, the author also provides some suggestions on the relevant policy measures of dental medical service.

1. Further improve the hierarchical treatment system of the oral healthcare industry.

The purpose of establishing the hierarchical treatment system is to allocate medical resources effectively, so that different levels of patients can get the necessary, reasonable high-quality services in medical institutions at various levels. In this way, the phenomenon

that large hospitals are overcrowded and the basic level hospitals are rarely visited by patients can be avoided. Unlike other service industries, there are often doctor-patient disputes in the oral industry so it is necessary to establish trust between doctors and patients. Therefore, on the basis of full investigation and assessment, the government should provide some support and supervision for high-quality secondary dental institutions, rather than private dental institutions to operate on its own. The nature of capital is profit seeking, which runs counter to the public nature of oral medical industry. Therefore, the government needs to play a role of coordinating patients and hospitals and supervising hospitals. Meanwhile, with the government's support, the interests of medical staff can be guaranteed. Secondly, medical institutions do not have the ability to investigate the needs of patients in a large scale. Therefore, it is necessary for the government to plan and establish the hierarchical treatment system, including providing necessary hardware facilities, coordinating the work between medical institutions at all levels, so that the patients can be transferred between different levels of hospitals according to treatment needs. Finally, the effective functioning of the hierarchical treatment system also needs the government to strengthen the popularization and promotion of relevant knowledge in order to change people’s deep-rooted wrong ideas of "big hospitals are always good" and encourage patients to visit hospitals that are suitable for their own condition instead of blindly trusting large hospitals. At the same time, it is necessary to establish the pre-diagnosis system and strengthen pre-diagnosis ability of community hospitals, which can greatly reduce the patients' misjudgment of their own disease and promote the implementation of hierarchical treatment system.

2. Further reform the management system of public oral medical institutions and promote the reasonable allocation of high-quality medical resources.

On the basis of promoting the hierarchical treatment system, we need to further optimize the allocation of resources in public hospitals. Because of the Chinese culture and social system in China, patients have high trust in large public medical institutions and doctors also choose to work in large public medical institutions for their own development. With the development of medical reform, although some regions have started pilot programs to allow doctors to flow between different medical institutions to study or do part-time jobs, compared with developed countries, the experts, doctors, pharmacists, and senior nurses in public hospitals in China still do not reach their fullest potentials. On the other hand, doctors, for their own development, also need to undertake some scientific research tasks with the support of hospital equipment and resources, therefore they have no freedom and time to do part-time job or start businesses. Therefore, it is necessary to further improve the management system

of public dental institutions, establish the alliance of oral medical institutions, and sponsor public-private joint hospitals. On the one hand, overcrowding patients in large hospitals can be diverted to private hospitals to achieve the effective utilization of the medical resources and reduce the burden of the large hospitals. On the other hand, with the support of public hospitals in equipment and resources, private institutions can gradually improve the overall medical level and provide more choices and better medical environment for patients.

3. Further guide dental institutions to cultivate enterprise culture and provide high-quality soft environment for patients.

An increasing number of medical institutions have come to realize that the enterprise culture plays a critical role in improving the patients' perceived service quality. According to the requirements of national medical reform, the hospital should continuously strengthen cultural development and cultivate unique enterprise culture better than others. A good medical culture atmosphere can enhance corporate image and harmonize the doctor-patient relationship, boost morale of medical staff and unite the employees as one towards the goal of constantly improving the medical service quality of the institution. Because of its public nature and specialist services, dental medical institutions need the government’s support to build cultural advantages to the benefits of the public. For example, hospitals should strengthen cultural training, assess employees’ cultural awareness and award those who have great contributions to enterprise culture. Under the background of the Chinese medical system and culture, only if the government pays enough attention can medical enterprises actively and effectively foster excellent culture and set an example for other enterprises.

4. Ensure the operation of dental institutions in accordance with law and strengthen effective supervision.

Unlike other service institutions, the quality of medical services has implications for patients’ health and life safety, which are very important for sustainable and stable development of the society. Different from other market players, the medical activities must be put under intensive supervision of the government.

Firstly, the medical market access system should be strictly implemented in accordance with laws and regulations. The Regulations on Medical Institutions (2016) require that those institutions that want to apply for establishing medical organizations and obtaining medical business licenses must have the medical equipment and personnel and management system up to relevant standards. The regulators and law enforcement agencies must strictly examine and review from the following several aspects according to relevant national regulations to determine whether the institutions have enough qualifications to provide medical services. 1)

Whether there are basic medical equipment and facilities, and whether the quantity and quality of equipment and facilities meet the requirements of the specifications. 2) Whether the internal management and supervising system meet the requirements of the specifications. 3) Whether there are necessary business plans within the institution and whether the institution is operated according to the preset plans, such as the effective and reasonable planning of medical area and the strict separation of bacterial area and sterile area. 4) Whether there are professional training and operation specifications. In strict accordance with the law and regulations above, the medical institutions can establish a reasonable and legal internal management system.

Secondly, the annual inspection and assessment of medical qualifications shall be strictly implemented to control the issuance of medical licenses. According to the national regulations, the relevant license issuing authorities shall regularly review the qualifications of oral medical institutions. The responsible department of the government should not only review the necessary information, but also conduct field investigation, and seriously review the medial qualifications of the hospital from the medical departments, medical personnel, medical waste treatment and daily hygiene maintenance. For the evaluation indicators that are not up to the standards, rectification notice will be issued. If the medical institutions found to be unqualified fail to meet the rectification requirements, their medical institution practicing license shall be revoked according to law. While strictly implementing supervision, the licensing department shall critically review the qualifications of the enterprises applying for entering into medical field.

Thirdly, we should establish an archive system for medical institutions and implement the responsibility system. The responsibility system has been implemented for a long time in other industries in China, such as the person responsible for river and community management. The purpose is to clarify who shall take the responsibilities in the event of accidents. By establishing archive data files for dental institutions and appointing the direct responsible person, the responsible person will have a strong sense of responsibility and take initiative to strengthen the hospital management and improve the perceived service quality patients. Meanwhile, the hospital archives can help the regulatory departments to effectively supervise medical institutions, understand the current situations of dental institutions and adjust policies if necessary. Besides, it is necessary to strengthen the training for the responsible person to enhance his/her awareness of national and local policies. The responsible person is the driving force for reform of oral medical institutions. Only when the responsible person has a good understanding of the national policies, can the medical

institutions improve the medical service quality and cultivate excellent enterprise culture according to the relevant national policies.

Finally, strengthen the internal and external supervision system and establish a multi-level supervision mechanism. The government regulators shall regularly carry out inspections and require the oral medical service institutions to operate according to the laws and regulations. The hospitals that fail to pass the inspections in some aspects will be required to rectify. The government should organize the medical staff to participate in training aimed at helping them to understand the latest policies issued by the national and local governments. The relevant health supervision and disease control department shall establish expert team to regularly review and evaluate the qualifications of the medical institutions. The medical institutions that have been performing well in observing health management specifications shall be rewarded. For medical institutions that do not meet the health regulations and requirements, they shall be ordered to rectify, and in extreme cases, the license of medical institutions performing badly will be revoked. Besides, the medical institutions should establish internal monitoring department to regularly check and inspect the internal health situation and put forward rectification measures. At the social level, we should give full play to the role of patients in supervision and create the channels for patients to feedback opinions and complaints, through network and telephone line, and patients' complaints will be handled and addressed within 24 hours. At the government level, the medical institutions should be put the joint supervision of multiple departments, including city administration bureau, environmental protection department and market regulation department. The coordinated efforts by multi-departments can not only supervise the medical institutions in a scientific and systematic way, but also effectively punish the illegal dental institutions to protect the immediate interests of patients.

In summary, with the promotion of medical reform and the improvement of high-quality development in other industries, dental institutions as the industry that has bearing on national interest and people's livelihood have attracted increasing attention. This research explores the relationship between perceived service quality, perceived value, satisfaction and behavioral intention in surveyed dental hospital. Based on the research conclusions, the author also put forward some suggestions on the national health policy with an aim to improve dental service quality for patients.

6.3 Research limitations and Prospects

6.3.1 Research limitations

In order to improve the perceived service quality of patients in dental hospitals, the research explores the relationship between perceived service quality, patient satisfaction and behavior intention and perceived value and reaches research conclusions. However, this research has many limitations as follows.

(1) It is necessary to increase the evaluation dimensions of oral medical service quality. Apart from the influence of the national health insurance policy, the main influencing factors include enterprise image, service facilities and service personnel, base on which this research measures the perceived service quality. With the improvement of the oral medical technology, the measurement dimensions will change.

(2) Limitations of research data. The paper questionnaire of this research was handed over to patients, which is highly reliable. To encourage respondents to express their true thoughts, all questionnaire papers are filled without any external interference.In this questionnaire, some questions may cause confusions among respondents. Respondents might answer those questions in a hurry, leading to inaccurate answers to the actual situation. Those facts might affect the data quality and reduce the representativeness. Moreover, the sample size is limited, making some analyses incomplete. Therefore, the sample size needs to be further expanded.

(3) Limitations of the research model. This research mainly discusses the impact path regarding the relationship between the quality of dental service, perceived value, patient satisfaction and behavioral intention. In fact, there are many other influencing factors not included in the model, such as the patients' needs for emergency treatment and the ability of accepting new things. Therefore, the model constructed in this research has limitations.

6.3.2 Research prospects

Based on the limitations of this research, we put forward the following suggestions for the further research

(1) Improve the model: a) After the analysis of variance, it can be seen that there are significant differences in perceptions of various variables for patient of different ages. In the future analysis, it is advised to introduce age as a moderating variable to further explore the impact relationship, so that managers can meet the needs of patients at different ages. b) The research subjects of this research are patients having received treatment, and therefore the

research conclusions are static. In the further research, we can consider the longitudinal study to explore how the relationship between different variables changes with the passage of time.

(2) Patient participation is very important for the improvement of the service quality, but this research has not conducted the in-depth study on patient participation because of the limitation of research purpose. In the future research, we can explore the impact of the degree of patient participation on patients' satisfaction and behavioral intention.

(3) Use more research methods. Questionnaire survey will be affected by many uncontrollable factors, and the above defects can be overcome through data analysis and processing. Therefore, in the future research, we can combine questionnaire survey with accurate data analysis to make the research results more reliable and scientific. Besides, it is hoped that the service cost of dental services can be covered by medical insurance.

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Annex A: Questionnaire

Effect of Patients' Perceived Service Quality on Satisfaction and Behavioral Intention

Dear patients,

This questionnaire is designed to learn about patients' perceived hospital service quality. It helps improves the quality of hospital management, diagnosis and treatment and supporting services as well as promotes the further development of stomatological medical industry. We appreciate your taking time to fill in this questionnaire. You are kindly reminded that the information collected in this survey is only for academic purposes. Thank you for your support.

Part One: Main body of the questionnaire

The numbers 1 to 5 on the right indicate your acknowledgement of the items on the left. "1" for strongly disagree; "2" for disagree; "3" for generally agree; "4" for relatively agree; and "5" for strongly agree. Please mark a "√" on relevant number based on the services you received and how you truly felt.

Number	Model variable	Item	Strongly disagree←→ Strongly agree				
I. Perceived quality of enterprise image (EI)							
EI1	Enterprise publicity	Appropriate hospital publicity and reputation	1	2	3	4	5
EI2	Response mechanism	No responsibility evasion from both parties in doctor-patient disputes	1	2	3	4	5
EI3		The hospital values and responds quickly to my comments or complaints	1	2	3	4	5
EI4		Reasonable waiting time	1	2	3	4	5
EI5	Price mechanism	Reasonable treatment cost and	1	2	3	4	5

		clear and easy price list					
EI6	Service mechanism	The hospital provides me with health guidance, return visits, psychological care.	1	2	3	4	5
EI7		The hospital can provide me with special help services besides treatment	1	2	3	4	5
II. Patient participation (PP)							
PP1	Information sharing	Share with medical staff your treatment information	1	2	3	4	5
PP2	Responsibility behavior	Actively cooperate with the treatment	1	2	3	4	5
PP3	Interpersonal interaction	Proactively communicate with doctors about your condition, needs and questions	1	2	3	4	5
PP4	Information searching	Proactively understand relevant knowledge about this treatment before seeing the doctor	1	2	3	4	5
III. Perceived quality of service facility (SF)							
SF1	Medical facility	Treatment facilities are in good conditions, with no faults in operation	1	2	3	4	5
SF2	Auxiliary facility	Enough basic facilities including washrooms, rest areas, indicators, with good functions, appropriate publication and clear indication	1	2	3	4	5
SF3		Auxiliary facilities (including Wi-Fi, printers) are enough in number and highly modernized	1	2	3	4	5

SF4	External environment	Convenient traffic to the hospital and good external environment	1	2	3	4	5
SF5	Hospital environment	Quiet hospital environment, good sanitary conditions, fresh air	1	2	3	4	5
IV. Perceived quality of service personnel (SP)							
SP1	Treatment effect	The attending doctor can correctly describe my conditions	1	2	3	4	5
SP2		The attending doctor can provide the treatment results precisely and timely	1	2	3	4	5
SP3	Service attitude	Guiding staff of the hospital can precisely tell me the conditions of hospital and relevant information in detail	1	2	3	4	5
SP4		Doctors can ask me about my conditions, answer my questions and provide treatment	1	2	3	4	5
SP5		Technical staff can deal with emergency quickly	1	2	3	4	5
SP6		Staff can understand my needs and provide help quickly	1	2	3	4	5
SP7		Medical staff are decent in appearance and behaviors	1	2	3	4	5
SP8	Privacy protection	Medical staff can respect and protect my privacy	1	2	3	4	5
V. Perceived value (PV)							
PV1	Functional value	Basic medical technology equipment and professional care level can meet my needs	1	2	3	4	5

PV2	Emotional value	This treatment is pleasant	1	2	3	4	5
PV3	Social value	The service means and quality of the hospital is worth promoting	1	2	3	4	5
PV4	Efficiency value	This treatment is worth the money I paid	1	2	3	4	5
V. Patient satisfaction (PS)							
PS1	General satisfaction	Satisfied with the general services of the treatment	1	2	3	4	5
PS2	Compared with expectation	The actual feelings and expectations of this treatment were roughly the same	1	2	3	4	5
PS3	Compared with ideal situation	This treatment can meet my demands in general	1	2	3	4	5
VII. Behavioral intentions (BI)							
BI1	Repurchase intention	If I have any problems again, I will come to the hospital for treatment.	1	2	3	4	5
BI2	Recommendation intention	Will promote the hospital or treatment through WeChat, Weibo.	1	2	3	4	5
BI3		If I have a chance, I will recommend friends to the hospital for treatment	1	2	3	4	5
BI4	Higher price purchase intention	Willing to pay higher prices for treatment at private hospitals	1	2	3	4	5

Part Two: General Information

1. Your gender is:

A. Male B. Female

2. Your age is:

A. under 18 B. 18 to 25 C. 26 to 35 D. 36 to 45 E. 46 to 60 F. over 60

3. What is your educational background?

A. Never attended senior high school B. Graduated from high school or secondary technicalschool C. Junior college or university graduate D. Obtained a master's degree or higher

4. Your position is:

A. Staff member of a company or public institution B. Self-employed C. Freelancer D. Student E. Retiree F. Other

5. How many times have you been to a stemmatological hospital for medical treatment?

A. Once B. Twice C. Three D. Four or above

6. Major reasons for your visit to a stemmatological hospital include: (multiple choices)

A. Orthodontics B. Oral implant C. Aesthetic repair D. Pediatric dental treatment